...uments Room

Industrial Reference Service

U. S. DEPARTMENT OF COMMERCE, HENRY A. WALLACE, *Secretary*
Bureau of Foreign and Domestic Commerce, AMOS E. TAYLOR, *Director*

Part 1. TRANSPORTATION and PUBLIC UTILITIES

Available in Parts Covering Selected Services and Commodities
Annual Subscription $1.50. Price this report 5 cents
For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., or Department Field Offices

Volume 4—Part 1 | January 1946 | Number 1

Highways of Colombia

Prepared by the Transportation Unit, James C. Nelson, Chief



Courtesy *El Grafico*, Bogota.

Colombia: Bridge over Ijagui River

D 1574

Digitized by Google

Highways of Colombia

Based on reports of Foreign Service Officers, United States Embassy, Bogota

Prepared by Edgel C. Skinner, Transportation Unit

This report is the second of a series of highway studies, reviewing the status of highway transportation in each of the 20 Latin American Republics. The first issue was Highways of Peru.

The series is being initiated to present data concerning the highway mileage and type of construction, adequacy of the highway system in terms of economic needs, and national policy in regard to new road construction. It is believed that this information will aid the motor vehicle and construction machinery and equipment industries in making analyses of market potentialities in these countries not only for a short-range program in the immediate future, when equipment depreciated and retired during the war will be replaced, but for a long-range program in the future, after the present demand for replacements has been met.

Basic information concerning economic and financial factors to be considered in analyzing market potentialities is being published in the International Reference Service. Information concerning motor vehicle registration and data concerning construction machinery and equipment will appear in the Machinery and Motive Products Part of the Industrial Reference Service.

General Information

The Republic of Colombia, with about 913 miles of coastline on the Pacific Ocean and 1,094 miles on the Caribbean Sea, has an area of 439,828 square miles and a population (estimated in 1944) of 10,082,000. Although the population density is about 22.9 persons per square mile, there are great variations in the various regions of the country, with the heaviest concentration in the mountainous interior.

Colombia's economic pattern, characterized by isolated commercial areas, each to a great extent economically independent of the other, results from the fact that the three major Andean mountain ranges—Western, Central, and Eastern Cordilleras—extend from north to south through the western section of the country. These mountain ranges, with peaks reaching 18,000 feet in altitude in this part of South America, delineate four topographical areas:

1. The Caribbean coastal lowlands, tropical in climate except in the northeastern section, where a branch of the Eastern Cordillera extends to the coast.
2. The Pacific coastal lowlands also generally tropical in climate.
3. The mountainous interior, tropical to frigid in climate.
4. The tropical eastern and southeastern llanos, with grasslands in the north, where the region is drained by the Orinoco River system, and forests in the south, where the rivers are a part of the Amazon system.

Transportation Routes

Surface transportation between these topographical areas is effected by a combination of water, rail, and highway carriers.

The Caribbean lowlands have surface transportation connections with the mountainous interior via both the Magdalena River—the country's principal traffic artery—and railroads and roads, which supplement and feed the river traffic.

From Barranquilla and Cartagena, the principal Carribbean ports, imports move up the Magdalena to the various river ports from which railroads and/or roads afford surface links with the several commercial areas—Medellin, Bogota, Ibague, Manizales, and Bucaramanga. From these commercial centers, distribution to the towns and villages of the interior is effected via rail and/or road.

Rail and/or road connections from two ports, Buenaventura and Tumaco, furnish surface links between the Pacific coast and the interior.

From Buenaventura, there are rail connections with Cali, Medellin, and Popayan. However, Bogota, the capital and chief commercial center, can be reached only by a combination of rail and highway transport as the Ibague-Armenia road is the only surface link between the western and eastern railroads. From Tumaco, there is a combination rail and highway link with Pasto, the interior distribution center of the southwest region.

The eastern llanos have surface connections with the other regions of the country via a few roads, which generally extend from the Eastern Cordillera to a navigable river of either the Orinoco or Amazon system. The full economic exploitation of this vast region awaits the further extension of the road system into the region.

Highway Development

The highway system of Colombia, comprising both the roads under the jurisdiction of the National Government and those under the authority of the various departments, totaled 11,166 miles at the end of 1944. Of this total road mileage, national roads accounted for 6,586 miles; departmental roads, for 4,580 miles.

On the basis of the total road mileage, there was in 1944 one mile of road per 39.4 square miles of area. As measured by ranking this figure with the comparable statistics of each of the other 20 American Republics, the country was eighteenth in highway development. It is of some significance, however, that the mileage of the national highways, in 1944, had increased 29.4 percent as compared with their mileage in 1939. Data for making a similar comparison of departmental road mileage between the two dates are not available.

As of January 1, 1944, motor vehicle registration totaled 32,042 units, with 11,055 trucks, 4,096 buses, and 16,891 passenger cars. The number of motor vehicles per mile of road was 2.9 units. In 1941, before wartime shortages of motor vehicles and motor parts affected the normal ratio of motor vehicles to mile of road in the 21 American Republics, Colombia, with 3.3 vehicles per mile of road, was fifth when ranked with the other 20 American Republics.

Within the country, the development of highway transportation, as measured by mileage, compares favorably with that of the other surface transportation media. On the basis of 1,878 route miles of rail line, as reported in 1944, there was one mile of rail line per 234.2 square miles of area.

Although there are several thousand miles of navigable rivers in the country, the most used water routes total only about 1,300 miles. Nevertheless, water transportation via the Magdalena River is the most important factor in surface transportation in Colombia. If pipeline traffic is excluded, this river, supplemented by feeder roads and rail lines, carries the major part of Colombia's foreign trade, which comprises the greater portion of the traffic hauled by the country's transport system.

At the same time, the importance of highway transport to the economy of the country cannot be overlooked. As indicated by the above comparison of the mileages of the three forms of surface transport, roads serve a greater area of the country than either rail lines or waterways.

Construction Types

Table I shows the mileage of each type of road construction for both national and departmental roads in 1944. About 70 percent of all Colombian roads are surfaced with dirt-rock, gravel, or macadam; 6 percent, with asphaltic concrete and penetration asphalt. Most national roads are surfaced with dirt-rock, gravel, or macadam at the time of construction, and plans have been made for paving the national trunk highways with asphalt from beds in the Department of Boyaca.

Administration and Regulation

Construction and maintenance of the national highway system is under the jurisdiction of the Direccion de Carreteras y Ferrocarriles (Bureau of Highways and Railways) of the Ministerio de

Digitized by Google

Obras Publicas (Ministry of Public Works). Departmental roads are constructed and maintained by the various departmental governments.

In general, road construction contracts are given to native contractors, but United States firms long established in Colombia have been awarded a number of contracts and are reported to have a good chance of obtaining contracts in the future.

Tariff schedules and routes of highway common carriers are under the jurisdiction of the Direccion Nacional de Transportes y Tarifas (National Board of Transportation and Rates). Sectional transportation boards, recently created, are vested with authority to:

1. Fix routes and schedules for carriers according to regulations established by the National Board.
2. Issue transport tariffs for various roads.
3. Grant licenses to new carriers.
4. Supervise the road police (chain) stations. (Like most Latin American countries, Colombia polices its highways from stations, where chains are stretched across the road to stop traffic for registration and inspection, rather than by highway police patrols.)
5. Forward to the National Board all statistics on vehicles and traffic.
6. Distribute motor transportation in accordance with the number of vehicles allotted to each road.
7. Issue permits for the purchase of new vehicles within the quota granted for each section.
8. Control distribution of tires.

Highway Expenditures

The Ministerio de Obras Publicas (Ministry of Public Works) in a summary of the 1943-44 annual report to the National Congress reported that the National Government had spent 96,000,000 pesos (approximately $54,720,000) for road construction since 1938. It was estimated that the cost of construction to complete the projected national trunk roads would require the expenditure of 31,075,000 pesos (approximately $17,712,000). The following figures are a breakdown of the 1944-45 road budget.

Item	*Pesos* [1]
Maintenance	7,114,000
Paving	404,200
Construction:	
Roads	4,807,300
Bridges	76,000
Total	12,401,500

[1] The peso equals approximately U. S. $0.57.

In general, Colombian highways have been financed by foreign and internal loans as well as by current revenues. Law 88 of 1931—Colombia's national highway act—provides that the National Congress shall appropriate each year the funds necessary for the maintenance of the national highways. The amount of the maintenance appropriation by Law 88 of 1931 is not to be less than the estimated revenues of the gasoline and other highway taxes.

Since the enactment of Law 88 of 1931, however, the Government has been authorized to use as much as 50 percent of the gasoline taxes to guarantee loans floated to finance the paving of the national roads. Funds for highway construction are to be appropriated annually from "ordinary or extraordinary resources."

Highway Transportation

Highway transport has assumed an important role in Colombian economy both in its function as a feeder to the other transportation media (engaged in hauling foreign trade for the most part) and as a lifeline in the domestic transport of food supplies to the cities. Although there are no statistics of motor traffic, it is reported that trucks carry more tonnage than railroads.

However, highway transport, like that of many sections in the United States before 1930, has not attained the status of an industry. There are few large truck or bus fleets. Rather, most of the motor carriers are private contractors, who own one or two units.

An important employer of private contractors is the National Railways, which employs private owners on a contract basis to haul traffic over the Ibague-Armenia road, joining the western and eastern railway systems.

The most common type of motor vehicle in public service is a 1½- to 2-ton truck, with locally built stake, platform, or bus body.

Principal Highways

Plan of the Highway System

The plan or design of the national highway system projects four trunk highways, with secondary roads either joining two trunk highways or serving as feeders to a trunk highway, railway, or navigable river. The departmental roads serve as feeders to a trunk highway or one of the other transportation media.

Three of the trunk highways—the Western, Eastern, and Central—cross the country from north to south, and the fourth—the Transversal—runs in general from east to west. No trunk highway, however, has been completed in all sections. On the Western Trunk Highway (1,070 miles in length as projected), sections totaling about 119 miles remained to be constructed at the end of 1944; on the Eastern (850 miles in length as projected), 158 miles; on the Central (613 miles in length as projected), 105 miles; and on the Transversal (1,157 miles in length as projected), 540 miles.

Table 2 shows the length and surface classification, by sections, and the altitude at various points of each of the four trunk highways and the principal secondary national roads.

Western Trunk Highway

The Western Trunk Highway starts from Cartagena, on the Caribbean Sea, and runs via Medellin, Cartago, Popayan, and Pasto to Rumichaca, on the Ecuadorean border.

The section of the Western Trunk Highway north of Medellin, 431 miles in length, runs through level lowlands—the cattle regions of the Department of Bolivar—before climbing into highlands in the Department of Antioquia. At the end of 1944, this northern division had two incomplete sections—The Carreto-El Carmen and the Pueblo Nuevo-Puerto Ospina, 29 and 90 miles, respectively, in length.

The section of the Western Trunk Highway south of Medellin, 639 miles in length, runs through territory of marked variations in topography. From Medellin, 5,046 feet in altitude, the road crosses a valley to Caldes, 5,896 feet in altitude, and continues to Santa Barbara—19 miles from Caldas—over a plateau of more than 8,000 feet above sea level before descending to 6,027 feet at Santa Barbara.

From Santa Barbara, the road descends to the Cauca River at La Pintada, then climbs to Valparaiso, 4,505 feet in altitude. Between Valparaiso and Cauya, the road dips in and out of the various coffee valleys of the department of Caldas as it winds through a knot of the Central and Western Cordilleras.

Between Cauya and La Virginia, the road descends into the Cauca River valley, through which it continues for 264 miles to Popayan. The section of the highway between La Virginia and Popayan is, in general, straight and level except for two stretches—one hilly, a short distance north of Cartago, and the other rolling and mountainous, about 30 miles in length, south of Santander.

Between Popayan and La Union, a distance of more than 100 miles, the highway runs through very rugged terrain, and traffic directed from chain stations, 10 to 20 miles apart, is one-way. From La Union, the road widens and runs via Pasto through high mountain valleys to the Ecuadorean border.

Eastern Trunk Highway

The Eastern Trunk Highway starts from the International Bridge, on the Venezuelan border, and extends via Cucuta, Pamplona, Tunja, Bogota, and Neiva to Tres Esquinas, in the southeastern llanos. When completed, the highway will be 850 miles in length.

The section of the Eastern Trunk Highway north of Bogota, 387 miles in length, crosses the high central plateau of the Eastern Cordillera. From the International Bridge, the road extends through a level agricultural region to Cucuta, 705 feet in altitude, but climbs within a distance of 45 miles to an altitude of 7,677 feet at Pamplona.

Between Pamplona and Duitama, a distance of 195 miles, the road runs across plateaus, 10 to 12 thousand feet in altitude, except for descents into Andean river valleys. From Duitama, the road crosses a plateau—lower in altitude than those to the north—to Tunja, 9,252 feet above sea level, and continues to Bogota, 8,661 feet in altitude.

Digitized by Google

through a district, level and rolling in topography.

The section of the Eastern Trunk Highway south of Bogota, 463 miles in length, continues through the Eastern Cordillera to the rolling jungle country of the southeastern llanos. At the end of 1944, there were two incomplete sections on this road—the Pandi-Colombia and the Venecia-Tres Esquinas—with 62 and 96 miles, respectively, of road to be constructed.

Between Bogota and Pandi, a distance of 64 miles, the road descends about 5,000 feet. From Pandi, construction continues for about 6 miles and is not completed from the other end of the Pandi-Colombia section except for a stretch, 10 miles in length, north of Colombia. From Colombia, the road runs to Neiva, on the Magdalena River, and continues along the east side of the Magdalena through a semi-arid region to Puertoseco.

From Puertoseco, the road, of one-car width in several places, crosses rugged terrain to Garzon. Between Garzon and Altamira, the terrain becomes more level but from Altamira passes through a deep canyon of a Magdalena River tributary to Guadalupe. This road between Altamira and Guadalupe has steep grades and in places is wide enough for only one car. From Guadalupe, the road climbs rapidly to Florencia, where it descends just as rapidly, passing through rolling jungle to Venecia, the end of construction.

Central Trunk Highway

The Central Trunk Highway runs from Santa Marta, on the Caribbean Sea, to Barbosa, in the department of Boyaca, via Cienaga, Ocana, and Bucaramanga. As projected, the highway will be 613 miles in length when completed.

From Santa Marta, the road and the Santa Marta Railway, which runs parallel to the road as far as Fundacion, follow the coast to Cienago. From Cienago, both the road and railroad run southeast to Fundacion. However, the section of the highway between Aracataca and Fundacion, a distance of 4 miles, was incomplete in 1944.

From Fundacion, the highway skirts the Sierra Nevada de Santa Marta and crosses the river valleys and hot arid plains of the Department of Magdalena to Caracoli. From Caracoli, the road runs northeast to Valledupar and continues eastward to La Paz, from which point it runs south to La Mata. A section between Rincon Hondo and La Mata, 45 miles in length, remained to be completed in 1944.

From La Mata, the road extends east to Convencion, where it connects with a road, which follows the South American Gulf Pipeline to Petroles, on the Venezuelan border. From Convencion, the highway runs through the western slopes of the Eastern Cordillera southward to Barbosa. A section between Abrego and Malpaso, 56 miles in length, was incomplete in 1944.

The Central Trunk Highway is connected with Bogota via four secondary national and departmental roads joining the Central and Eastern Trunk highways—the Bucaramanga-Pamplona, Los Curos-Malaga, San Gil-Duitama (a departmental road between San Gil and Charala), and Barbosa-Tunja roads. When completed, the Cucuta-Sardinata-Abrego road will afford another connection.

Transversal Trunk Highway

The Transversal Trunk Highway is projected to extend from Turbo, on the Uraba Gulf, to Puerto Carreno, on the Venezuelan border in the eastern llanos, via Medellin, La Dorada, Honda, Bogota, and Villavicencio. As projected, the road will be 1,157 miles in length when completed.

The Turbo-Medellin section of the highway, 238 miles in length, will pass through tropical jungles before climbing into the Western and Central Cordilleras. At the Turbo end of the highway, 9 miles of construction had been completed in 1944; at the Medellin end, 158 miles.

The incomplete stretch of the Turbo-Medellin section will run through a low but slightly sloping region, with a heavy annual rainfall. From the eastern end of construction, the road runs through open country, with scattered farms, but within a short distance begins to follow the canyon of the Sucio River, with grades of easy ascent, to Dabeiba.

Between Dabeiba and Medellin, both the Western and Central Cordilleras are crossed at altitudes of about 8 thousand feet, with an intervening drop to 2,296 feet in the Cauca River valley. Grades, in general, are easy although in a few sections they reach 8 percent.

The Medellin-Bogota section of the highway descends from the Central Cordillera to the Magdalena River valley and climbs into the Eastern Cordillera. This part of the highway has two incomplete sections—The Narino-La Dorada and the Honda-Guaderas—with 55 and 19 miles, respectively, of construction to be completed.

From Medellin, the road crosses difficult terrain of river valleys and high mountain passes to La Dorada, on the Magdalena River. Between La Dorada and Honda, a distance of 19 miles, the road and the La Dorada Railroad—running parallel to this section of the highway—follow the Magdalena, which in this section has rapids separating the lower and upper river. From Honda, 751 feet in altitude, the road climbs rapidly to Guaduas, 3,304 feet in altitude, but descends at Villeta to 2,762 feet. From Villeta, the road climbs to 8,530 feet at Los Alpes—20 miles from Villeta—and continues at this altitude over a plateau to Bogota, 8,661 feet above sea level.

The section of the Transversal Trunk Highway between Bogota and Puerto Carreno crosses the eastern slopes of the Eastern Cordillera and descends into the eastern llanos. At the close of 1944, there were 396 miles of construction to be completed on the Puerto Lopez-Puerto Carreno section.

Between Bogota and Villavicencio, the road passes through rugged terrain, and traffic directed from chain stations is one-way in three stretches. From Bogota, the road climbs the western side of the Andean range which forms the watershed between the Magdalena and Orinoco rivers and crosses the pass—12 miles south of Bogota—at an altitude of 10 thousand feet. From the pass, the road descends with steep grades to Caquez. Between Caquez and Villavicencio, the road crosses rugged mountainous country, but the grades are not as steep as in the previous section. From Villavicencio, which lies on the western edge of the llanos, the road crosses the llanos to Puerto Lopez and when completed will extend to Puerto Carreno across the same level country.

Other Roads

Bogota, the capital and chief commercial center, is afforded highway connections with Medellin, Cartago, and Cali, important commercial centers on the Western Trunk Highway, by two secondary roads—The Los Alpes-Cambao-Manizales-Cauya, which leaves the Transversal Trunk Highway 33 miles west of Bogota, and the Arbelaez-Ibague-Armenia-Morillo, which starts from the Eastern Trunk Highway 48 miles south of Bogota. The Manizales-Pereira-Cartago and the Armenia-Pereira-Cartago roads are terminal variants which run from Manizales and Armenia, respectively.

Another significant road is the Cali-Buenaventura, which, when all construction is completed, will afford Buenaventura, the more important of Colombia's two principal Pacific ports, a highway as well as rail link to the interior distribution centers.

Los Alpes - Cambao - Manizales - Cauya road.—The Los Alpes-Cambao-Manizales-Cauya road drops from the Eastern Cordillera into the Magdalena River valley, then climbs into the Central Cordillera before descending into the Cauca River valley. About half of the road's 206-mile length is through solid rock cuts.

From Los Alpes, 8,530 feet in altitude, the road descends, within a distance of 10 miles, to about 6,500 feet above sea level and continues, in the next 40 miles, down to 1,200 feet at the Magdalena River. From the Magdalena, the road climbs to 8,000 feet within 45 miles and continues to 11,000 feet in the next 25 miles before dropping to 7,500 feet at Manizales. Between Manizales and Cauya, the road drops into and climbs from the Cauca River valley.

Arbelaez - Ibague - Armenia - Morillo road. — The Arbelaez-Ibague-Armenia-Morillo road, like the Los Alpes-Cambao-Manizales-Cauya road, drops into the Magdalena River valley from the Eastern Cordillera and climbs into the Cen-

Digitized by Google

tral Cordillera before coming into the Cauca River valley.

From Arbelaez, the road descends to the Magdalena River at Girardot, 1,070 feet in altitude, and continues, with the Girardot-Tolima-Huila Railroad running parallel, through the Magdalena valley to Espinal. From Espinal, the road climbs to Ibague, 4,101 feet in altitude.

The Ibague-Armenia section of the road, connecting the Pacific and Ambelena-Ibague railroads, is the only transportation link between the country's eastern and western railways. From Ibague, the road climbs to 10,892 feet at La Linea—41 miles from Ibague—and descends in the next 21 miles to 4,432 feet at Armenia.

From Armenia, the road continues through mountainous terrain until it descends into the Cauca River valley at Morillo and joins the Western Trunk Highway. The terminal variant, the Armenia-Pereira-Cartago road, is about 50 miles further, but the terrain through which it passes is not as mountainous.

Cali-Buenaventura road.—The Cali-Buenaventura road, 88 miles in length, has been officially open since 1944. However, it will be some time before construction is complete and the road is used for commercial traffic.

From Cali, 3,291 feet in altitude, the road climbs to an altitude of 6,844 feet in the first 11 miles, then, in the next 7 miles, drops to 4,022 feet.

In the next section, 10 miles in length, the highway continues at altitudes between 4,000 feet and 4,500 feet, then, in the next 15 miles, drops to 994 feet. In the latter section, traffic controlled from three chain stations, is one-way. After continuing at altitudes between 1,000 and 1,500 feet in the next section, the road drops to sea level about 20 miles east of Buenaventura.

Pan American Highway

The Pan American Highway in Colombia will consist of two routes, comprising sections of several of the national highways. As projected, the routes will form a figure X, with the center at Bogota and the four terminal points on the borders of Venezuela, Ecuador, Panama, and Brazil.

From the International Bridge, on the Venezuelan border, the Venezuela-Ecuador route of Colombia's Pan American Highway follows the Eastern Trunk Highway via Cucuta and Tunja to Bogota. From Bogota, the route continues along the Eastern Trunk Highway to Arbelaez, from which point it follows the Arbelaez-Ibague-Armenia-Morillo road. This part of the route is frequently referred to as the Simon Bolivar Highway. Between Morillo and the Ecuadorean border, the route follows the Western Trunk Highway via Popayan and Pasto. It will be noted that all of this part of the route is open to traffic.

The Panama-Brazil section of the Pan American route has not been constructed at either terminus. Depending upon the route of Panama's section of the Pan American Highway from Chepo, Colombia's Panama-Brazil route of the Highway will begin at one of three points: Turbo, from which point it would be necessary to use a ferry to connect with a road that probably would run to Trigana Bay from Chepo; a point near the Caribbean side of the Isthmus of Panama; or a point near the Pacific side of the Isthmus.

If the Panama-Brazil route begins from Turbo, it will follow the Transversal Trunk Highway to Bogota; if from the Caribbean side of the Isthmus, a section of road, about 93 miles in length, will be constructed between the Panamanian frontier and a section of the Transversal Trunk Highway near Pavarandocito, from where the route will follow the Transversal Trunk Highway to Bogota; if from the Pacific side of the Isthmus, a road on which sections totaling 240 miles will need to be constructed will run via Bahia Solano and Quibdo to Medellin, on both the Transversal and Western Trunk highways.

A traveler between Panama and Ecuador will be able to go directly from Medellin via the Western Trunk Highway. Thus the Medellin-Morillo section of the Western Trunk Highway becomes an alternate section of the Pan American Highway.

From Bogota, the Panama-Brazil route of the Colombian Pan American Highway will continue via the Transversal Trunk Highway to Villavicencio, from where it will follow the road of the United States Rubber Corporation, recently given over to the National Government, to San Martin. It is planned to build a road from San Martin to Mitu, on the Brazilian border.

Adequacy of Highways

The highway system of Colombia for the most part furnishes highway links only for the more densely populated mountainous interior. However, notable progress has been made, in the last 10 years, in joining this region's disconnected local roads into a national highway system. The northeastern Venezuelan border is now connected by highway with the southwestern Ecuadorean frontier.

With the completion of the national trunk highways, a trend toward more domestic commerce, accelerated by the war, may be expected to become more pronounced. The movement, extending roads into the eastern and southeastern llanos, is an important step toward the exploitation and fuller economic development of this region. Colombia's comparatively high ratio of motor vehicles to mile of road in prewar years is indicative of the importance of highway transportation in the country.

Outlook

Surface transportation in Colombia generally is effected by a combination movement via water, rail, and/or highway or rail and highway. In these movements, highway transport is very important to the economy of the country. The Ibague-Armenia road is a vital link in the movement of foreign trade from Buenaventura—the more important of the two principal Pacific ports—to the interior.

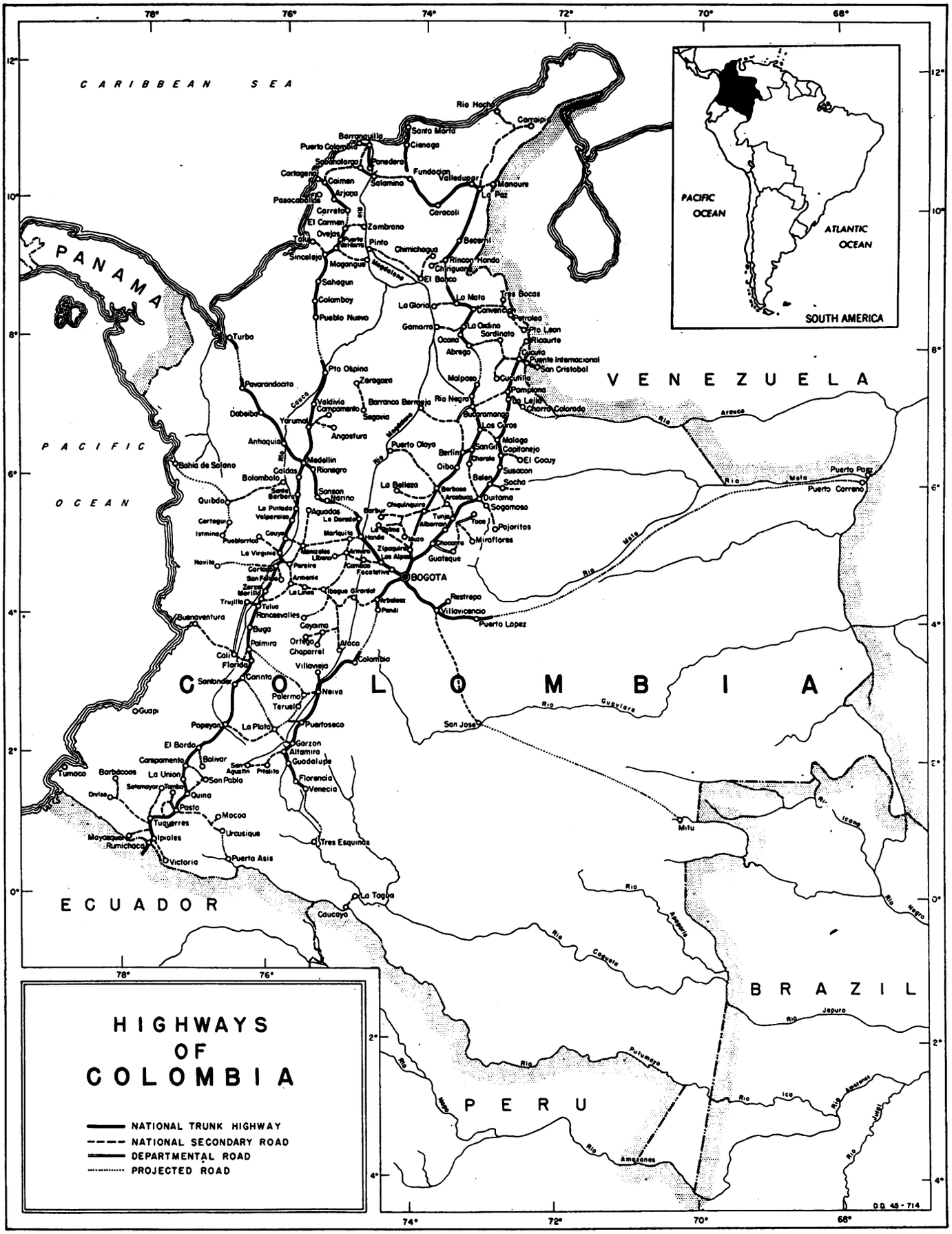
Although to date the Colombian highway system is a series of disconnected roads, a national highway system consisting of four trunk highways is planned. Three of these trunk highways—the Western, Eastern, and Central—will cross the country from north to south, and the fourth will run in general from east to west. In view of a growing sentiment that it is advisable to use available financial resources to complete the roads projected, both trunk and secondary, it may become the policy of the Government to complete the roads already begun before starting the construction of new highways.

TABLE 1.—*Colombian Highway Mileage by Construction Type, 1944*

Construction type	Miles			Percent of total		
	National	Departmental	Total	National	Departmental	Total
Paved	571	136	707	8.7	2.0	6.4
Dirt-rock, gravel, and macadam	5,394	2,404	7,798	81.9	53.5	69.8
Not specified	621	2,040	2,661	9.4	44.5	23.8
Total	6,586	4,580	11,166	100.0	100.0	100.0

Source: United States Embassy, Bogota.

Digitized by Google



Digitized by Google

TABLE 2.—*Principal Colombian Highways*

Highways and sections	Type of surface	Approximate length of section (Miles)	Approximate altitude at initial terminus (Feet)
Western Trunk Highway:			
Cartagena-Carreto	Paved[1] and surfaced[2]	45	
Carreto-El Carmen	Projected	29	
El Carmen-Pueblo Nuevo	Paved and surfaced[2]	109	433
Pueblo Nuevo-Mile 90	Projected	90	
Mile 90-Puerto Ospina	Surfaced	5	
Puerto Ospina-Medellin	do	153	
Medellin-Caldas	Paved	15	5,046
Caldas-Santa Barbara	Surfaced	19	5,896
Santa Barbara-La Pintada	do	18	6,027
La Pintada-Valparaiso	do	15	
Valparaiso-Cauya	do	58	4,505
Cauya-Cartago	do	44	
Cartago-Morillo	do	43	3,090
Morillo-Buga	do	31	
Buga-Palmira	do	29	3,313
Palmira-Popayan	do	117	3,560
Popayan-Pasto	do	171	5,740
Pasto-Tuquerres	do	45	8,510
Tuquerres-Rumichaca	do	34	10,184
Eastern Trunk Highway:			
International Bridge-Cucuta	Paved	10	
Cucuta-Pamplona	Surfaced	45	705
Pamplona-Malaga	do	85	7,677
Malaga-Capitanejo	do	22	4,039
Capitanejo-Susacon	do	33	3,986
Susacon-Belen	do	39	
Belen-Duitama	do[3]	16	
Duitama-Tunja	do[3]	36	8,497
Tunja-Albarrain	do	25	9,252
Albarrain-Choconta	Paved	24	
Choconta-Bogota	do	52	8,809
Bogota-Mile 18	do	18	8,661
Mile 18-Arbelaez	Surfaced	30	
Arbelaez-Pandi	do	16	
Pandi-Colombia	Projected[4]	78	3,360
Colombia-Neiva	Surfaced	62	
Neiva-Garzon	do	73	1,548
Garzon-Altamira	do	19	2,913
Altamira-Florencia	do	63	3,540
Florencia-Venecia	do	8	
Venecia-Tres Esquinas	Projected	96	
Central Trunk Highway:			
Santa Marta-Cienaga	Surfaced	17	13
Cienaga-Aracataca	do	39	
Aracataca-Fundacion	Projected	4	
Fundacion-Caracoli	Surfaced	57	203
Caracoli-Valleduparo	do	46	
Valleduparo-La Paz	do	11	663
La Paz-Becerril	do	51	
Becerril-Rinco Hondo	do	29	492
Rinco Hondo-Mile 45	Projected	45	
Mile 45-La Mata	Surfaced	20	
La Mata-Convencion	do	20	
Convencion-Ocana	do	22	
Ocana-Abrega	do	19	3,937
Abrega-Malpaso	Projected	56	6,896
Malpaso-Bucaramanga	Surfaced	47	
Bucaramanga-Los Curos	do	21	3,340
Los Curos-Berlin	do	43	
Berlin-Oiba	do	20	
Oiba-Barbosa	do	46	
Transversal Trunk Highway:			
Turbo-Mile 9	do	9	6
Mile 9-Mile 80	Projected	71	
Mile 80-Dabeiba	Surfaced	33	
Dabeiba-Medellin	do	125	2,296
Medellin-Rionegro	Paved	24	5,046
Rionegro-Sonson	Surfaced	56	6,955
Sonson-Honda	do	[5] 146	
Honda-Mile 19	Projected	19	751
Mile 19-Los Alpes	Surfaced	48	
Los Alpes-Facatativa	do	9	8,530
Facatativa-Bogota	do	25	8,576
Bogota-Villavicencio	do	76	8,661
Villavicencio-Puerto Lopez	do	55	1,634
Puerto Lopez-Puerto Carreno	do	[6] 461	
National roads connecting Western Trunk Highway:			
Caiman-Barranquilla	Paved	83	
El Carmen-Zambrano	Surfaced	26	
Puerta de Hierro-Magangue	Paved	45	
Sincelejo-Tolu	do	25	449
Yarumal-Angostura	Surfaced	14	
Yarumal-Campamento	do	10	
Cauya-Manizales	do	40	
La Virginia-Pueblorico	do	42	
Western Trunk-Pereira-Armenia	do	38	
Western Trunk-Pereira-Manizales	do	41	
Cartago-Novita:			
Cartago-Brisas	do	28	3,091
Brisas-Novita	Projected	59	
Cartago-San Felipe	Surfaced	16	3,091

Highways and sections	Type of surface	Approximate length of section (Miles)	Approximate altitude at initial terminus (Feet)
National roads connecting Western Trunk Highway (Continued):			
Morillo-Ibague:			
Morillo-Armenia	Surfaced	58	5,312
Armenia-La Linea	do	21	4,432
La Linea-Ibague	do	16	10,892
Palmira-Cali-Buenaventura:			
Palmira-Cali	Paved	28	3,560
Cali-Buenaventura	Surfaced	88	3,291
Florida-Cali-Buenaventura:			
Florida-Cali	do	[7] 32	
Cali-Buenaventura	do	88	3,291
Popayan-La Plata:			
Popayan-Mile 66	do	66	5,740
Mile 66-La Plata	Projected	25	
El Bordo-Bolivar	Surfaced	35	3,323
Quino-La Cruz-Campamento:			
Quino-San Pablo	do	38	
San Pablo-Florencia	Projected	[7] 7	
Florencia-Campamento	Surfaced	[7] 7	
Pasto-Las Mesas-Pto. Asis:			
Pasto-Las Mesas	do	90	8,510
Las Mesas-Urcusique	do	6	
Urcusique-Pto. Asis	Projected	47	
Pasto-Las Mesas-Mocoa:			
Pasto-Las Mesas	Surfaced	90	8,510
Las Mesas-Mocoa	do	6	
Western Trunk Road-Yacuanquer-Tambo	do	56	
Tuquerres-Sotomayor:			
Tuquerres-Samaniego	do	28	10,184
Samaniego-Sotomayor	Projected	22	5,036
El Espino-Junin-Barbacoas	Surfaced	92	
El Espino-Junin-Diviso	do	65	
Guachucal-Mayasquer:			
Guachucal-Portachuelo	do	23	
Portachuelo-Mayasquer	Projected	16	
Ipiales-Victoria	Surfaced	24	9,482
National roads connecting Eastern Trunk Highway:			
Cucuta-Ricaurte	do	14	705
Cucuta-Abrego:			
Cucuta-Sardinata	do	63	705
Sardinata-Mile 78	do	15	
Mile 78-Mile 98	Projected	20	
Mile 98-Abrego	Surfaced	28	
Pamplona-Bucaramanga	do	83	7,677
La Lejia-Arauca River:			
La Lejia-Charro Colorado	do	17	
Charro-Colorado-Mile 47	do	30	
Mile 47-Arauco River	Projected	16	
Malaga-Los Curos	Surfaced	78	4,038
Capitanejo-Cocuy	do	35	3,986
Belen-Eastern llanos:			
Belen-Mile 40	do	40	
Mile 40-Eastern llanos	Projected		
Duitama-Charala	Surfaced	64	8,497
Duitama-Eastern llanos:			
Duitama-Mile 64	do	64	8,497
Mile 64-Mile 94	Projected	30	
Tunja-Barbosa:			
Tunja-Arcabuco	Surfaced	22	9,252
Arcabuco-Barbosa	do	24	
Tunja-Muzo:			
Tunja-Arcabuco	do	22	9,252
Arcabuco-Chiquinquira	do	42	
Chiquinquira-Muzo	do	52	8,432
Tunja-Maripi:			
Tunja-Arcabuco	do	22	9,252
Arcabuco-Chiquinquira	do	42	
Chiquinquira-Mile 86	do	[7] 22	8,432
Mile 86-Maripi	do	9	
Tunja-Barbur:			
Tunja-Arcabuco	do	22	9,252
Arcabuco-Chiquinquirca	do	42	
Chiquinquirca-Mile 83	do	[7] 19	8,432
Mile 83-Barbur	do	25	
Tunja-Guateque:			
Tunja-Mile 16	do	16	9,252
Mile 16-Tibana	do	10	
Tibana-Mile 32	do	[7] 6	
Mile 32-Garagoa	Projected	12	
Garagoa-Guateque	Surfaced	16	5,676
Tunja-Miraflores	do	51	9,252
Ventaquemada-Tibana	do	16	
Arbelaez-Ibague:			
Arbelaez-Girardot	do	38	
Girardot-Chicoral	do	21	1,070
Chicoral-Ibague	do	27	
Arbelaez-Chaparrel:			
Arbelaez-Girardot	do	38	
Girardot-Chicoral	do	21	1,070
Chicoral-Saldana	do	17	
Saldana-Covaima	do	25	
Coyaima-Chaparrel	do	25	1,440

Digitized by Google

TABLE 2.—*Principal Colombian Highways—Continued*

Highways and sections	Type of surface	Approximate length of section (Miles)	Approximate altitude at initial terminus (Feet)
National roads connecting Eastern Trunk Highway (Continued):			
Arbelaez-Ataco:			
Arbelaez-Girardot	Surfaced	38	.....
Girardot-Chicoral	..... do	21	1,070
Chicoral-Saldana	..... do	17	.....
Saldana-Coyaima	..... do	25	.....
Coyaima-Ataco	..... do	24	1,440
Arbelaez-Ortega:			
Arbelaez-Girardot	..... do	38	.....
Girardot-Chicoral	..... do	21	1,070
Chicoral-Saldana	..... do	17	.....
Saldana-Ortego	..... do	38	.....
Arbelaez-Castilla:			
Arbelaez-Girardot	..... do	38	.....
Girardot-Chicoral	..... do	21	1,070
Chicoral-Saldana	..... do	17	.....
Saldana-Castilla	..... do	24	.....
Arbelaez-Roncesvalles:			
Arbelaez-Girardot	..... do	38	.....
Girardot-Chicoral	..... do	21	1,070
Chicoral-Mirolindo	..... do	24	.....
Mirolindo-Mile 37	..... do	37	.....
Mile 37-Roncesvalles	Projected	30	.....
Neiva-Rio Bache:			
Neiva-Palermo	Surfaced	14	1,548
Palermo-Rio Bache	..... do	17	1,968
Neiva-Teruel:			
Neiva-Palermo	..... do	14	1,548
Palermo-Teruel	..... do	17	1,968
Puertoseco-La Plata:			
Puertoseco-Paicol	..... do	18	.....
Paicol-La Plata	Projected	16	.....
Garzon-Corinto:			
Garzon-La Plata	Surfaced	36	2,913
La Plata-Cohetando	..... do	17	3,458
Cohetando-Corinto	Projected	66	.....
Altamira-San Agustin	Surfaced	52	3,540
National roads connecting Central Trunk Road:			
Fundacion-Salamina	..... do	50	203
La Paz-Rio Hacha:			
La Paz-Cuestecita	..... do	82	.....
Cuestecita-Rio Hacha	..... do	46	.....
La Paz-Carraipia:			
La Paz-Cuestecita	..... do	82	.....
Cuestecita-Carraipia	..... do	19	.....
La Paz-Manaure	..... do	11	.....
Rincon Hondo-Chiriguana	..... do	9	.....
La Mata-La Gloria	..... do	14	.....
Convencion-Tresbocas:			
Convencion-Rio Tibu	..... do	[7] 90	.....
Rio Tibu-Tresbocas	..... do	[7] 25	.....
Convencion-Pto. Leon:			
Convencion-Rio Tibu	..... do	[7] 90	.....
Rio Tibu-Petrolea	..... do	[7] 25	.....
Petrolea-Pto. Leon	..... do	14	.....
National roads connecting Central Trunk Road (Continued):			
La Ondina-Gamarra:			
La Ondina-Mile 10	Projected	10	.....
Mile 10-Aguachica	Surfaced	25	.....
Aguachica-Gamarra	..... do	9	.....
Abrego-Cucuta:			
Abrego-Mile 28	..... do	28	6,896
Mile 28-Mile 48	Projected	20	.....
Mile 48-Sardinata	Surfaced	15	.....
Sardinata-Cucuta	..... do	63	.....
Bucaramanga-Pamplona	..... do	83	3,340
Los Curos-Malaga	..... do	78	.....
Berlin-Barranca Bermeja	..... do	102	.....
Barbosa-Pto. Olaya	..... do	112	.....
Barbosa-Tunja	..... do	46	.....
Barbosa-La Belleza	..... do	38	.....
National roads connecting Transversal Trunk Highway:			
Honda-Mariquita	..... do	11	751
Los Alpes-Manizales:			
Los Alpes-Cambao	..... do	56	8,530
Cambao-Armero	..... do	15	1,200
Armero-Mariquita	..... do	17	1,381
Mariquita-Manizales	..... do	77	1,755
Los Alpes-Libano:			
Los Alpes-Cambao	..... do	56	8,530
Cambao-Armero	..... do	15	.....
Armero-Libano	..... do	23	1,381
Los Alpes-Albarado-Ibague:			
Los Alpes-Cambao	..... do	56	8,530
Cambao-Armero	..... do	15	1,200
Armero-Albarado	..... do	42	1,381
Albarado-Ibague	..... do	23	.....
Villavicencio-Restrepo	..... do	11	1,634
Villavicencio-Mitu:			
Villavicencio-San Martin	..... do	45	1,634
San Martin-San Jose	..... do	[7] 119	.....
San Jose-Mitu	..... do	[7] 299	.....

[1] The part of this road completed before 1941 was paved. It is not known whether all of the sections completed after this date were paved.

[2] Surfaced roads include roads surfaced with dirt-rock, gravel, or macadam.

[3] Paving reported under way in October 1944.

[4] Construction completed 6 miles south of Pandi and 10 miles north of Colombia.

[5] At end of 1944, there was an incomplete section of about 55 miles between Narino and La Dorada.

[6] At end of 1944, there was about 396 miles of construction to be completed on the Puerto Lopez-Puerto Carreno section of Transversal Trunk Highway.

[7] Estimated.

Source: Ministry of Public Works, Colombia.

Department of Commerce Field Service

Atlanta 3, Ga., 603 Rhodes Bldg.

Boston 9, Mass., 1800 Customhouse.

Buffalo 3, N. Y., 242 Federal Bldg.

Charleston 3, S. C., Chamber of Commerce Bldg.

Chicago 4, Ill., 357 U. S. Courthouse.

Cincinnati 2, Ohio, Chamber of Commerce.

Cleveland 14, Ohio, 753 Union Commerce Bldg., Euclid Ave., at East 9th St.

Dallas 2, Tex., Chamber of Commerce Bldg.

Denver 2, Colo., 566 Customhouse.

Detroit 26, Mich., 1028 New Federal Bldg.

Houston 14, Tex., 603 Federal Office Bldg.

Jacksonville 1, Fla., 425 Federal Bldg.

Kansas City 6, Mo., 724 Dwight Bldg.

Los Angeles 12, Calif., 1540 U. S. Post Office and Courthouse.

Memphis 3, Tenn., 229 Federal Bldg.

Minneapolis 1, Minn., 201 Federal Office Bldg.

New Orleans 12, La., 408 Maritime Bldg.

New York 6, N. Y., 61 Broadway, 5th Floor.

Philadelphia 2, Pa., 1510 Chestnut St.

Pittsburgh 19, Pa., 1013 New Federal Bldg.

Portland 4, Oreg., Room 313, 520 S.W. Morrison St.

Richmond 19, Va., Room 2, Mezzanine, 801 E. Broad St.

St. Louis 1, Mo., 107 New Federal Bldg.

San Francisco 11, Calif., 307 Customhouse.

Savannah, Ga., 513 Liberty National Bank and Trust Bldg., Bull and Broughtin Sts.

Seattle 4, Wash., 809 Federal Office Bldg.

☆ U. S. Government Printing Office: 1946—677448

Digitized by Google

Documents Room

Industrial Reference Service

U. S. DEPARTMENT OF COMMERCE, HENRY A. WALLACE, *Secretary*
Bureau of Foreign and Domestic Commerce, AMOS E. TAYLOR, *Director*

Part 1. TRANSPORTATION and PUBLIC UTILITIES

Available in Parts Covering Selected Services and Commodities
Annual Subscription $1.50. Price this report 5 cents
For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., or Department Field Offices

Volume 4—Part 1 | February 1946 | Number 2

Railways of Colombia

Arranged for Publication in the Transportation Unit, James C. Nelson, Chief

Based on reports of Foreign Service Officers, United States Embassy, Bogota, Colombia, and other official reports

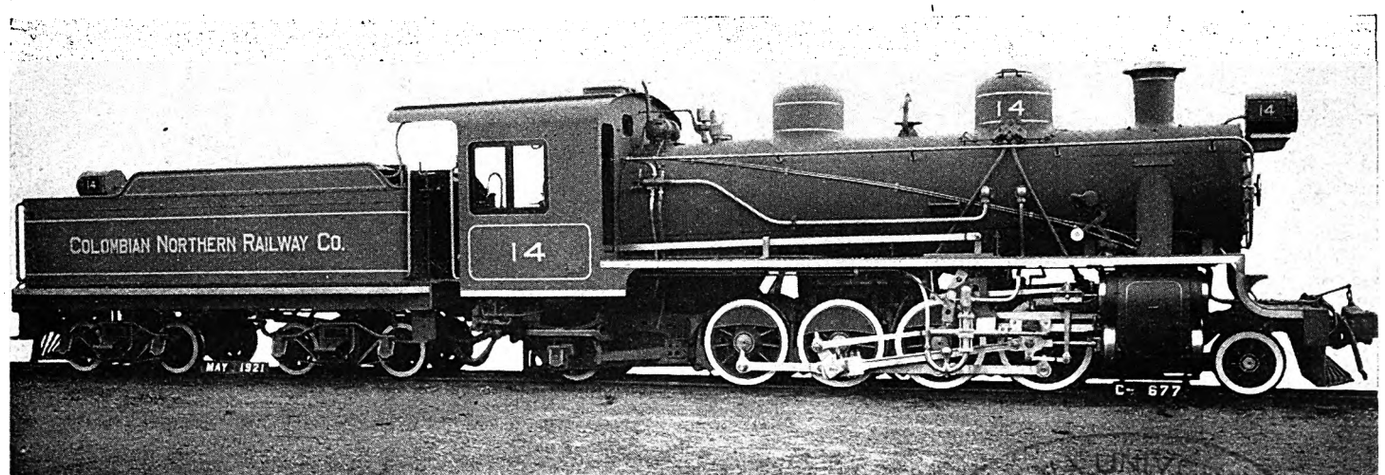
Prepared by Irma Grace Bate, Transportation Unit

The Republic of Colombia is primarily an agricultural country with nearly one-half million (439,828) square miles of fertile land where practically every type of product in the world can be raised. Although at the present time only 2 percent of the land area is cultivated, 23 percent is given to grazing, and 50 to 60 percent is virgin woodland, agriculture is a growing industry and the most important activity in the economic structure of the Nation.

Geographically, Colombia has the advantage of a two-ocean coastline; 913 miles bordering the Pacific Ocean and 1,094 miles fronting the Caribbean Sea. In a fan shape from north and northeast to south, Colombia is crossed by three distinct Andean mountain ranges forming a variety of regional divisions from the arid to rain-drenched tropics, from flat tablelands to high plateaus and mountain peaks, from jungles to the populous cultivated areas. Although Colombia is definitely in the tropics, much of the more heavily populated sections are at altitudes high enough to result in either a temperate or only semitropical climate.

Colombia ranks third among South American nations in both size and population (an estimated 10,082,000 inhabitants in 1944). Most of the Colombians, of whom roughly half are of mixed Indian and Spanish blood, live in the valleys and plateaus of the mountainous west. The Negro population is concentrated largely along the coast, while that of pure Spanish descent is predominantly urban. The vast areas of natural unused grasslands and forest in the eastern part of the country are sparsely populated.

Colombia is rich in a wide range of natural resources. Her wealth is perhaps more evenly distributed than that of any of the other South American nations. Gold has long been an important item, but coffee has far surpassed it in modern times as its chief economic export. Dyewoods and bananas are important commercially, as are petroleum, emeralds, and other minerals.



American Locomotive in use on Colombian Northern Railway (Ferrocarril Central del Norte, Seccion Segunda y Sur) since, 1922

MAR 9 1946
D 11924
LIBRARY
Digitized by Google

The growth of light industry, particularly textiles, processed foods and building materials has been an important factor in Colombia's economic stability in recent years. This has not only decreased her dependence on imports, which have principally been textiles, metallic products, transport materials, food, chemicals and machinery, but has stimulated economic activity all down the line from producer to consumer. Increased sale of agricultural products to the Canal Zone is also helping her economic status.

Although Colombia has a network of waterways, railroads, highways, and airways connecting the principal regions of the country, transportation costs make items expensive to the consumer, especially in the highlands. The topography and climate have made railroad and highway construction difficult and expensive.

There are limitations, of course, on the use of air transport which has been rather well developed. In fact, Colombia is the pioneer in commercial aviation in the Western Hemisphere, her first aviation company having started to carry passengers and mail as early as 1919.

The highways have developed hand in hand with the railroads and in recent years have, in many instances, supplemented the railroads by filling in the necessary gaps. Nevertheless, there is much to be desired in developing the transportation facilities within the country in order for them to adequately serve the Nation.

Railways of Colombia

Colombian railroads are few and far between, isolated from each other for the most part, but each serving the need in a particular area. On the basis of 3,025 kilometers of common carrier trackage in 1944, the area per kilometer of railroad track was 145.3 square miles. Most of the mileage is owned and operated by the Government, although the greater portion of the construction was done by British engineers. Colombia is taking steps to modernize its Pacific port of Buenaventura and the Government-owned railways have signed contracts for the expansion of freight handling capacity at the three Caribbean ports of Barranquilla, Cartagena and Puerto Colombia.

Railway traffic in Colombia increased from 5,800,000 passengers and 1,500,000 tons of freight in 1941 to 12,200,000 passengers and 2,900,000 tons of freight in 1944. Since, according to verbal reports, railway service in Colombia is restricted to daylight hours, it seems reasonable to suppose that by operating 24 hours a day the amount of railway traffic handled could be increased considerably and a certain amount of the congestion in railway traffic could be eliminated.

Motive power for the railroads is a highly varied assortment; some of it coming from European manufacturers and some from the United States. Due to extremely sharp curves and steep grades on many of the sections of the various railway lines, some of the locomotives do not have tenders; water is carried in tanks alongside boilers. Coal for these short runs is carried in small bins behind the engineer and fireman.

Freight and passenger cars are in general of United States types, adapted to local conditions. Boxcars and gondolas (some of the latter are all-steel) generally have capacities from 20,000 to 25,000 kilograms. A load for a freight engine in level sections, as in the Cauca Valley, will consist of from 20 to 25 cars, while on a mountain section in the Andes (Girardot-Tolima-Huila railroad line) 6 cars will be an average. The descent is so precipitous here that trains move down the mountainside in a series of switchbacks, going alternately backwards and forwards, as the grade is too steep for long loops.

Some of the railroad lines employ autoferros for fast passenger service. These units resemble overgrown buses and are operated much the same as heavy trucks.

Trackage and Ownership

The total main line trackage of the 15 principal common carrier railroads in Colombia is 3,025 kilometers. Of this total, the Government owns and operates 74 percent or a total of 2,240 kilometers (8 railroad lines); the Departmental Governments own and operate 17 percent or a total of 514 kilometers (3 railroad lines); while various private owners operate the remaining 9 percent or 271 kilometers (4 railroad lines).

Electrified Line

In addition to the common carrier lines, there are three electric street railways municipally owned and operated in the cities of Bogota, Medellin, and Pereira with a total main line trackage of 110.69 kilometers. Of this street railway trackage, 54 percent is 1.00 meter gage and the remaining 46 percent is 0.914 meter gage.

Cableways

Besides the railroad trackage, the Government owns and operates 119 kilometers of cableway.

Gage

Railway lines of different gages converge only at the Bogota terminus. Freight transfers are effected at that point by means of a transfer station.

Of the total trackage, 78 percent of all main line is 0.914 meter gage (1,646 kilometers or 54 percent Government-owned lines; 514 kilometers or 17 percent departmentally-owned lines; and 209 kilometers or 7 percent privately-owned lines) and the remaining 22 percent is 1.0 meter gage (594 kilometers or 20 percent Government-owned lines and 62 kilometers or 2 percent privately-owned lines).

Government Control

Not only is the greater part of the total main line trackage (74 percent) in the hands of the Colombian Government, but a trunk line is proposed by the Government (Ferrocarril Troncal de Occidente), which, when completed, would extend for 1,063 kilometers from the city of Popayan in the Department of Cauca in southern Colombia, to the Carribbean seaport of Cartagena. This would include the already existing Department and Government railroads running from Popayan to Anza in the Department of Antioquia and would cross the Departments of Cauca, El Valle, Caldas, Antioquia, and Bolivar.

Because of the mountainous terrain, the route of the railroad, when completed, would follow, in general, the valley of the Cauca River. This river traverses that part of Colombia which is most heavily populated and includes the great coffee plantations, gold mining centers, and industrial areas. Since the river itself is not navigable, except for a few miles for shallow-draft boats, a railroad is considered absolutely essential to the future prosperity and development of this area. The projected railway would be owned by the Government and would encompass the present Antioquian Departmental railway now in operation over part of the projected route.

This proposed railroad will probably not be taken up for quite sometime because the National Congress is at present contemplating extending the Ferrocarril del Pacifico from Armenia to Ibague and thence over present tracks to Bogota. Nevertheless, it is recognized by the entire Nation that the proposed Ferrocarril Troncal de Occidente would tend to unify the country through exchange of ideas, products, and population. In addition, it would open it to the outside world and would tend to lower freight costs of both imported and exported material.

Coordination of Facilities

Transportation is one of Colombia's greatest problems. The lack of coordination in the rail transport system has placed a heavy burden on its inadequate motor transport enterprise, which has been affected during recent years by shortages of motorized equipment, insufficient repair facilities, and the inability to purchase new equipment. The added burden on Colombia's railways, plus its inability to secure repair parts and to replace important rolling stock, has left the railroads in a deplorable condition.

With a deteriorating transportation system, which at its best could not adequately cope with increased traffic, the importance of the rivers as a means of transportation cannot be overlooked, since they play an overshadowing part in the Republic's economic life.

For example, the Magdalena River unites and affords an outlet to the Atlantic Ocean for 10 of the 14 Departments

Digitized by Google

of the Republic. Its total length is 1,223 kilometers, of which about 950 kilometers are below the rapids at Honda, separating the lower river from the upper. Cargo must be transferred at this point from the larger to the smaller river boats, or shipped over the railway or highway between La Dorada and Honda. According to leading Colombian authorities, some 60 percent of Colombia's total import and export commerce is transported via the Magdalena.

Colombian businessmen are interested in establishing additional and more modern river service, both for freight and passengers, and developments in this field may be expected in the very near future. To supplement this river traffic, there is a decided movement under way to build the proposed connecting sections of the Ferrocarril Troncal de Occidente which, when built, will give continuous service to the western half of the Republic of Colombia.

In addition to this, practically all Colombian railroads plan further extension of their lines in time to come. However, most of them will be very expensive and difficult to construct and remain to be considered in the future.

The accompanying information tends to incorporate the most useful data available regarding the common carriers operating in Colombia showing a breakdown into operating groups, such as: National, Departmental, Private, Street Railways, and Cableways. Each group is discussed separately, giving all pertinent data relative to the operation of the individual lines. Finally, there is a list of railroads no longer in operation.

Throughout this report the Colombian peso is equivalent to $0.57 United States currency.

Equipment for the Combined Eight Government-Owned Railways, 1945

Equipment	In operation	Not in operation	Total	Mean capacity	Weight half empty (Tons)
Locomotives:					
Steam	184	25	209	.....	.....
Gasoline	4	.....	4	.....	.....
Passenger cars:					
1st and 2d class	323	.....	323	[1] 47	16
Baggage cars	34	.....	34	[2] 25	14
Autoferros	40	.....	40	[1] 35	11
Freight cars:					
Closed cars	1,126	.....	1,126	[2] 24	10
Gondolas	376	.....	376	[2] 20	10
Flatcars	300	.....	300	[2] 24	9
Tank cars (fuel oil and gasoline)	15	.....	15	[3] 6,000	11

[1] Passengers.
[2] Tons.
[3] Gallons.

Note: All the aforementioned vehicles are equipped with hand brake and Westinghouse compressed air system, 30 percent of them with automatic couplings and the other 70 percent with manual couplings and safety chains.

Common Carriers—National Railways

Address: Consejo Administrativo de los Ferrocarriles Nacionales, Carrera 6a, No. 13-92, Bogota, Colombia.

Ownership: Federal Government.

Purchases: All purchases, except minor procurments, are made on public calls for tenders issued by the agency's commercial and purchasing department through Consejo Administrativo de los Ferrocarriles Nacionales, Bogota, Colombia. Minor procurements are made locally by the individual lines' purchase orders.

Name of railways	Route length, main line (Kilometers)	Total trackage (Kilometers)
Cartagena-Calamar	105	111
Central del Norte, Seccion Primera	117	128
Central del Norte, Seccion Segunda y Sur	224	254
Cundinamarca	200	223
Girardot-Tolima-Huila	368	398
Narino	111	114
Nordeste	253	285
Pacifico	862	922
Total kilometrage	2,240	2,435

Total Freight Transported by the Eight Government-Owned Railway Lines in 1943, according to Products

[In tons]

Paying cargo	Quantity	Non-paying cargo	Total cargo
Agricultural products	632,737	221,457	854,194
Animal products	131,278	.....	131,278
Forest products	141,475	.....	141,475
Mining products	594,490	.....	594,490
Manufactured products	920,323	.....	920,323
Baggage and livestock	38,783	.....	38,783
Other articles	80,168	.....	80,168
Total	[2] 539,254	221,457	2,760,711

Traffic statistics for the eight Government-owned railway lines for 1943 are as follows:

Freight ton kilometers:	
Paying cargo	322,183,081
Nonpaying cargo	21,941,634
Freight train kilometers	5,234,261
Average freight rate per ton kilometer	0.0455
Number of paying passengers carried	10,069,221
Number of nonpaying passengers carried	371,677
Passenger kilometers:	
Paying passengers	458,141,371
Nonpaying passengers	31,690,796
Passenger train kilometers	299,861
Average passenger fare per passenger kilometer	P 0.0112

Combined Operating Statistics of the Eight Government-Owned Railway Lines, 1943

[In Colombian pesos]

Name of railway	Operating revenue	Other revenue	Total revenue
Cartagena-Calamar	244,969.09	6,943.47	251,912.56
Central del Norte, 1a	605,936.99	44,690.56	650,627.55
Central del Norte, 2a	1,675,718.72	45,269.33	1,720,988.05
Cundinamarca	2,476,241.97	71,511.21	2,547,753.18
Girardot-Tolima-Huila	4,403,170.98	281,927.41	4,685,098.39
Narino	97,292.65	8,816.49	106,109.14
Nordeste	1,884,416.54	20,352.97	1,904,769.51
Pacifico	9,866,990.91	183,807.50	10,050,798.41
Total	21,254,737.85	663,318.94	21,918,056.79

Name of railway	Operating expense	Other expense	Total expense
Cartagena-Calamar	498,800.48	.....	498,800.48
Central del Norte, 1a	695,776.24	43,232.10	739,008.34
Central del Norte, 2a	1,565,584.50	29,737.89	1,595,322.39
Cundinamarca	1,925,620.85	234,387.23	2,160,008.08
Girardot-Tolima-Huila	2,780,780.56	225,758.72	3,006,539.28
Narino	200,099.41	7,058.43	207,167.84
Nordeste	1,485,047.09	46,644.46	1,531,691.55
Pacifico	6,956,059.70	163,068.26	7,119,127.96
Total	16,107,768.83	749,897.09	16,857,665.92

Summary:		
Total revenues		21,918,056.79
Investments in additions and improvements	1,329,881.38	
Total expenses	16,857,665.92	
Net revenue	3,730,509.49	
	21,918,056.79	21,918,056.79

[1] Colombian peso equivalent to $.57, U. S. currency.

CARTAGENA-CALAMAR RAILWAY (Ferrocarril de Cartagena-Calamar). Local address: Cartagena, Colombia.

Length: Main line, 105 kilometers; branches and sidings, 6 kilometers. Gage: 0.914 meters. Maximum curvature: 8°. Maximum gradient: 2.5 percent. Bridges: 125, Cooper, E-30. Tunnels: None. Brakes: Hand brakes and compressed air system (Westinghouse). Rails: All rails are 45 pounds per yard, in sections of 9 and 10 yards. Cross ties: Wood, average number per kilometer, 1,600.

Repair shops: Located at Cartagena, Colombia. Classification of freight carried: Manufactured and agricultural products. Employees (1945): 369, all Colombian.

Equipment (1945): Steam locomotives, 7 in operation, 3 not in service (weight on drivers, 684,006 pounds); rolling stock (1941), first class coaches,

Digitized by Google

4 (53 passengers); second class coaches, 3 (53 passengers); special coaches, 2 (43 passengers; baggage cars, 3 (10 metric tons); boxcars 53 (18.49 metric tons); flatcars, 22 (20.0 metric tons). Practically all of this equipment has been in service for the last 15 years.

Territory Served

This railroad roughly parallels, or at least roughly duplicates, the service of the Dique Canal. Over this route is moved cargo to or from large river vessels operating up the Magdalena from Barranquilla, and a small amount of local traffic. Combined river-rail rates are so arranged that it costs no more to ship to interior points in this manner than it does by direct river boat from Cartagena. As a result, the railroad acts to supplement the limited river boat service from this port.

Proposed Construction

For many years there has existed a project for a railroad from Cartagena to Antioquia, there to connect with the railroad from Medellin to Cali. This would be of extreme value and though the project has little prospect of fulfillment, even in the near future, it is believed that such a plan must be carried to completion sooner or later, unless future transportation developments completely outmode the railroad. Such a railroad should present an excellent opportunity for investment, for constructors, and the sale of equipment.

CENTRAL DEL NORTE, SECCION PRIMERA (Northern Central Railway, First Section). Local address: Calle 36, Carrera 20, Bucaramanga, Colombia.

Length: Main line, 117 kilometers; branches and sidings, 11 kilometers. Gage: 1 meter. Maximum curvature: 11° 30′. Maximum gradient: 2.5 percent. Bridges: 12 Cooper, E–40, 4 timber. Tunnels: 1 which opens on to a bridge over Rio de Oro. Brakes: Hand brake and Westinghouse compressed air system. Rails: 80 percent of the rails used are 55 pounds per yard in sections 9 and 10 yards long; 20 percent are 60 pounds per yard. Cross ties: Local hardwood averaging 1,660 per kilometer. Repair shops: Located at Bucaramanga. Classification of freight carried: Manufactured and animal products. Employees: (1945) 457, all Colombian.

Equipment, motive power (1945): 7 steam locomotives in operation, 2 not in operation; 3 gasoline locomotives. Rolling stock (1942): 96 freight cars, 14 passenger cars, 1 tank car, 1 Diesel "speeder."

Territory served.—The climate of the area served is hot and damp, and the country it crosses is such that proper maintenance of the railway is difficult.

Proposed Construction

At present this line operates between Estacion Bucaramanga to Puerto Wilches but there exists the project of the prolongation of this railway to join with the Northern Railway, Second and Southern Sections, to connect the lower Magdalena with Bogota to avoid delays in transports due to the difficult navigation of the river during the dry season. The conection of the two railways will be made in Bucaramanga, capital of the Department of Santander, and the terminal station of the Northern Railway, First Section. This extension would close a gap now filled by a highway, and would thus afford through rail transportation of the same gage to the capital at Bogota.

CENTRAL DEL NORTE, SECCION SEGUNDA Y SUR (Northern Central Railway, Second and Southern Sections). Local address: Estacion Norte, Bogota, Colombia.

Length: Main line, 224 kilometers; branches and sidings, 30 kilometers. Gage: 1 meter. Maximum curvature: 11° 30′. Maximum gradient: 3 percent. Bridges: 3, Cooper E–40. Tunnels: 2, located near Kilometer 96. Brakes: Hand brake and Westinghouse compressed air system. Cross ties: Wood, average number per kilometer, 1,660. Rails: 50 percent of rails used are 60 pounds per yard; the other 50 percent are 65 pounds per yard.

Repair shops: Located at Bogota, Colombia. Classification of freight: Minerals, manufactured and agricultural products. Employees (1945): 1,197, all Colombian.

Equipment, motive power (1945): 26 steam locomotives in operation, 11 not in operation (weight on drivers, 1,591,596 pounds); rolling stock (1941): boxcars, 91 in operation, 75 in good condition; cattle cars, 19 in operation and in good condition; gondolas, 100 in operation, 99 in good condition; platform cars, 84 in operation, 48 in good condition; passenger cars, 139 in operation, 138 in good condition.

Territory Served

This railway serves the central region of the Department of Cundinamarca and connects the capital of the Republic with the Departments of Boyaca and Santander in its southern part. The area served is varied; that is to say, it has flat and mountainous sections, but the declines are mostly smooth and the curvature is not excessive.

Proposed Construction

At present this line operates between La Caro and Barbosa (192 kilometers); Bogota and El Salto (32 kilometers). There exists a proposed extension of this line to join with the Northern Railway, First Section, connecting Bogota with the lower Magdalena to avoid delays in transports due to the difficult navigation of the river during the dry season. The connection of the two railways would be made in Bucaramanga, capital of the Department of Santander, today the terminal station of the Northern Railway, First Section.

CUNDINAMARCA RAILWAY (Ferrocarril de Cundinamarca). Local address: Estacion Sabana, Bogota, Colombia.

Length: Main line, 200 kilometers; branches and sidings, 23 kilometers. Gage: 0.914 meters. Maximum curvature: 14° 20′. Maximum gradient: 3.8 percent. Bridges: Cooper E–40. Tunnels: None. Clearance: 4 meters in height; 5 meters in width. Brakes: Hand brake and Westinghouse compressed air system. Cross ties: 85 percent wood, 15 percent metal; average per kilometer, 1,660. Rails: 33.5 percent of 60 pounds and 66.5 percent of 70 pounds per yard.

Repair shops: Located at Bogota, Colombia. Classification of freight carried: Manufactured, mineral and agricultural products. Employees (1945): 1,062, all Colombian.

Equipment, motive power (1945): steam locomotives, 23 in operation, 1 not in operation (weight on drivers, 2,626,707 pounds); gasoline locomotive, 1 (weight on drivers, 24,500); rolling stock (1941): boxcars, 70 in operation, 14 not in operation (average capacity, 24 metric tons); livestock cars, 22 in operation, 4 not in operation (average capacity, 22 metric tons); gondolas, 23 in operation, 4 not in operation (average capacity, 22 metric tons); flatcars, 20 in operation, 17 not in operation (average capacity, 22 metric tons); passenger cars, 66 in operation, 15 not in operation; work cars, 50 in operation, 12 not in operation.

Territory Served

This is the only railroad serving the northwestern region of the Department of Cundinamarca. The area served by this line from Bogota to Puerto Salgar is varied running northwestward across the plains and descending as it reaches the Rio Negro and following it until it reaches a point due east of La Dorada.

GIRARDOT-TOLIMA-HUILA (Ferrocarril de Girardot-Tolima-Huila). Local address: Estacion Sabana, Bogota, Colombia.

Length: Main line, 368 kilometers; branches and sidings, 30 kilometers. Gage: 0.914 meters. Maximum curvature: 16°. Maximum gradient: 4.6 percent. Bridges: 16 steel, Cooper E–40. Tunnels: 4. Brakes: Hand brake and Westinghouse compressed air system. Rails: 12.3 percent of the rails are of 45 pounds per yard in sections 9 and 10 yards long; 34.2 percent are 55 pounds per yard, 40.3 percent are 60 pounds per yards, and 13.2 percent are 75 pounds per yard. Cross ties: Wood, average number per kilometer is 1,660.

Repair shops: Located at Girardot and Facatativa. Classification of freight carried: Manufactured and agricultural products. Employees (1945): 1,506, all Colombian.

Equipment, motive power (1945): steam locomotives, 36 in operation, 2 not in operation (weight on drivers, 4,937,-568 pounds); rolling stock (1941): boxcars, 190 in operation, 18 not in operation

Digitized by Google

(capacity, 24 metric tons); livestock cars, 38 in operation, 8 not in operation (capacity, 23 metric tons); gondolas, 80 in operation, 6 not in operation (capacity, 24 metric tons); flatcars, 58 in operation (capacity, 23 metric tons); tank cars, 2 in operation (capacity, 23,000 liters); passenger cars, 85 in operation, 19 not in operation; work cars, 12 in operation.

Length of bus and truck routes operated by this line.—Truck service is furnished in conjunction with the 100 kilometer road between Ibague and Armenia. Only a part of the trucks are owned by the railroad company.

Territory Served

This line operates between Girardot and Facatativa (132 kilometers), Girardot and Ibague (77 kilometers), and Espinal to Neiva (159 kilometers), serving the Departments of Cundinamarca, Tolima, and Huila. The country traversed is varied from mountainous with many steep grades and curves to flat and regular with long straight stretches and few curves.

Proposed Construction

In order to effect through rail communication between Bogota and the port of Buenaventura, it is necessary that the gap of 100 kilometers between Ibague and the Pacific Railway terminal at Armenia—a gap now served by a highway—be closed by joining the two railroads. Such a project has been proposed.

NARINO RAILWAY (Ferrocarril de Narino). Local address: Tumaco, Colombia.

Length: Main line, 111 kilometers; branches and sidings, 3 kilometers. Gage: 0.914 meters. Maximum curvature: 11° 10′. Maximum gradient: 1.7 percent. Bridges: Cooper E–40. Tunnels: None. Brakes: Hand brake and Westinghouse compressed air system. Cross ties: Wood, 1,600 per kilometer. Rails: 5 percent of the rails are of 40 pounds per yard in 9 and 10 yard sections; 95 percent of the rails are 60 pounds per yard.

Repair shops: Located at Bucheli, Colombia. Classification of freight carried: Mineral, manufactured, and agricultural products. Employees (1945): 205, all Colombian.

Equipment, motive power (1945): steam locomotives, 5 in operation, 1 not in operation (weight on drivers, 354,000 pounds); rolling stock (1943): passenger cars, 6; freight cars, 12; cattle cars, 2. All equipment, considering its age, is in fair condition since there is only one movement daily.

Territory Served

This line operates from Tumaco to El Diviso and Ramal Rio Mira. The main importance of this line is in the hauling of freight from Tumaco to Ipiales where it is transported by trucks to Pasto and other cities in the Department of Narino.

Proposed Construction

An extension of this line to Popayan has been proposed—a gap now served by a highway—but it is doubtful that it will be undertaken in the very near future.

FERROCARRIL DEL NORDESTE (Northeastern Railway).[1] Local address: Estacion Norte, Bogota, Colombia.

Length: Main line, 253 kilometers; branches and sidings, 32 kilometers. Construction since 1940: 10 kilometers of track along the Sogamoso-Paz del Rio section up to the Siderurgica del Instituto de Fomento Industrial. Gage: 1 meter. Maximum curvature: 7° 40′. Maximum gradient: 2 percent. Bridges: Cooper E–40. Tunnels: None. Brakes: Hand brake and Westinghouse compressed air system. Cross ties: Wood and metal; average number per kilometer of track, 1,660. Rails: 50.5 percent of rails of 60 pounds per yard in sections 9 and 10 yards long; 49.5 percent of 65 pounds per yard.

Repair shops: Located at Bogota, Colombia. Classification of freight carried: Mineral, manufactured, agricultural and animal products. Employees 1945): 1,060, all Colombian.

Equipment, motive power (1945): steam locomotives, 18; weight on drivers, 1,406,000 pounds; rolling stock (1941): boxcars, 45 in operation, 7 not in operation; livestock cars, 45 in operation, 1 not in operation; gondolas, 85 in operation, 1 not in operation; flatcars, 9 in operation, 19 not in operation; passenger cars, 23 in operation, 13 not in operation.

Territory Served

This line operates between Bogota and Sogamoso. The terrain is varied—hills, valleys, and plains. Most of the livestock for the interior of the country is shipped from Sogamoso (commercial center of the eastern plains) over this railroad line.

FERROCARRIL DEL PACIFICO (Pacific Railway). Local address: Palacio Nacional, Cali, Colombia.

Length: Main line, 862 kilometers; branches and sidings, 60 kilometers. Construction since 1940: About 40 kilometers of track have been constructed in the Yumbo, San Marcos, and proposed Troncal de Occidente sections on this line. Gage: 0.914 meters. Maximum curvature: 17° 40′. Minimum curve radius: 80 meters. Maximum gradient: 4 percent. Brakes: Hand and Westinghouse compressed air system. Bridges: 9 steel and 1 concrete, Cooper E–30 and E–40.

[1] Under government ownership since 1939.

Tunnels: Total 13—lined with concrete, 10; solid rock, 2; both concrete and solid rock, 1 (longest, 3,528 meters). Clearance: Width, 10 feet; height above center of rail, 12 feet. Cross ties: Wood, average number per kilometer of track, 1,630. Rails: 96.5 percent are 55 pounds per yard in 9 and 10 yard sections; 3.5 percent are 60 pounds per yard.

Repair shops: Located at Chipichape, not far from Cali. Length of bus and truck routes operated: Between Armenia and Ibague, 100 kilometers. Classification of freight carried: Agricultural and manufactured products. Average car loading: Weight, 15 tons; limited to 30′ x 8′ x 8′. Employees (1945): 4,649, all Colombian. Autoferro service (Diesel-powered railway and cars): Operated from Cali to Cartago and Cali to Armenia.

Territory Served

This is the longest and most important railroad in Colombia. Its importance lies in the fact that by means of connections with other railroads and highways it links the port of Buenaventura with the Magdalena River, the capital city of Bogota, the port of Tumaco, and the neighboring Republic of Ecuador, and consequently, all freight movement arriving on the west coast of Colombia destined for the interior other than Narino must pass over this line.

Ferrocarril del Pacifico—Routes and Termini Between Individual Lines

Lines	*Kilometers*
Cali to Buenaventura	174
Cali to Alejandro Lopez	332
Zarzal to Armenia	57
Yumbo to San Marcos	10
Tulio Ospina to Anza Urrao	38
Cali to Popayan	159
Armenia to Nacederos	56
Timba to Santander	22
Palmira to Pradera	14
Total kilometrage	862

Ferrocarril del Pacific—Equipment

Item	In operation	Not in operation	Total	Capacity
Motive power (1945):				
Steam locomotives (weight on driver 6,653,070 pounds)	62	5	67	
Rolling stock (1941):				
Boxcars	340	8	348	[1]25
Cattle cars	52	.....	52	[1]25
Gondolas	115	11	126	[1]25
Flatcars	120	27	147	[1]25
Tank cars	7	.....	7	[2]22,710
Baggage cars	13	.....	13	[3]20
Dining cars	10	.....	10	[3]28
Special passenger cars	2	.....	2	[3]15
First-class coaches	65	.....	65	[3]43
Third-class coaches	52	.....	52	[3]53
Work cars	30	38	68	.....

[1] Metric tons.
[2] Liters.
[3] Passengers.

Digitized by Google

Common Carriers—Departmental Railways

Address: See individual railway data for official address.
Ownership: Each line owned by a Department.
Purchases: Major procurements are made on public bids; minor purchases are made locally through supplying agents.

Name of railways	Department	Length, main line (Kilometers)	Total trackage (Kilometers)
Ambalema-Ibague Railway	Tolima	65	65
Antioquia Railway	Antioquia	338	338
Caldas Railway	Caldas	111	123
Cundinamarca Railway	Cundinamarca	(1)	(1)
Total kilometrage		514	526

[1] In August 1938, the National Railways Administrative Council, in accordance with a contract entered into with the Department of Cundinamarca, took over the administration of the Cundinamarca Railway for a period of 10 years during which time it is to amortize the road's indebtedness and improve its service.

AMBALEMA-IBAGUE RAILWAY (Ferrocarril de Ambalema-Ibague). Local address: Buenos Aires, Department of Tolima, Colombia.

Length: Total trackage, 65 kilometers. Gage: 0.914 meters. Minimum radius: 143.36 meters. Maximum curvature: 8°. Average gradient: 1.7 percent. Bridges: 17 metal bridges of from 25 to 80 meters in width, single track, Cooper lines E–40. Tunnels: None. Rails: 55 pounds per yard in 9 and 10 yard sections. Cross ties: Heavy hardwood. Brakes: Hand brakes and compressed air system. Signaling method: Flags.

Repair shops: Located at Buenos Aires—equipped for general repairs and assembling. Classification of freight: Manufactured and agricultural products. Employees (1945): 189, all Colombian.

Equipment (1945): steam locomotives in operation, 6; first-class coaches, 4 (capacity, 40 passengers); third-class coaches, 7 (capacity, 50 passengers); boxcars, 25 (total capacity, 550 tons); gondolas, 5 (total capacity, 100 tons); flat, 3 (total capacity, 80 tons); cattle, 3 (total capacity, 80 tons).

Territory served.—This line serves as an intermediary line connecting the La Dorada Railway with the Girardot Railway in Buenos Aires. The area traversed is fairly level; the climate is hot but not unhealthful.

Ambalema-Ibague Railway Traffic Statistics

	1944
Total freight carried ....tons..	201,048
Freight ton kilometers	13,432,592
head livestock..	11,484
Freight train kilometers	87,152
Average freight rate per ton kilometer	[1] $0.07
Passengers carried	159,471
First class	40,802
Thi.d class	118,669
Passenger kilometers	7,892,930
First class	1,851,877
Third class	6,041,053
Passenger train kilometers	62,590
Average passenger fare per passenger kilometer	[1] $0.025
Operating revenue	P 600,000
Other revenue	(2)
Operating expenses	P 350,000
Other expenses	P 150,000

[1] Colombian.
[2] Not available.

ANTIOQUIA RAILWAY (Ferrocarril de Antioquia). Local address: Medellin, Colombia.

Length: Total trackage, 338 kilometers. Gage: 0.914 meters. Maximum curvature, variable and sharp—200 feet radius. Maximum gradient: 4.5 percent. Rails: steel, 60 pounds to the yard. Cross ties: Hardwood, spaced, 1,600 per kilometer. Bridges: 64 of Cooper E–40. Tunnels: 13 (one of which is 3,780 meters long). Clearance: 13 feet in width; 15 feet in height. Brakes: Compresed air and hand, mostly Westinghouse. Signaling method: By telephone.

Repair shops: Located at Medellin. Capacity—11 locomotives, 20 freight cars, 6 passenger cars, 2 motor rail cars; general repair work on tools and equipment. No complete units are built as there is no railway equipment industry devoted to such manufacture.

Classification of freight carried: Commodities are usually mixed, except for ores and livestock. Mixed trains (freight and passenger) are also frequently used. Employees (1945): 394 clerical staff; 2,920 workmen, all Colombian. Capitalization: Outstanding P 7,913,655.08 ($4,522,089). Routes and termini between individual lines: Medellin to Puerto Berrio; Medellin to Alejandro Lopez.

Equipment (1945): steam locomotives, 48 in operation, 6 not in operation, weight on drivers, 3,773,520 pounds; passenger cars, 79 in operation, 2 not in operation (capacity, 45 passengers; weight 14 tons); baggage cars, 10 (capacity, 18 tons and 10 tons); motor-rail cars, 15 (capacity, 4 passengers, 800 kilograms); boxcars, 273 (capacity, 25 tons); gondolas, 91 (capacity 27 tons); flatcars, 75 (capacity, 20 and 25 tons); tank (gasoline), 4 (capacity, 6,200 gallons); refrigerator (ice), 8 (capacity, 15 tons); industrial, 10 in operation, 30 not in operation (capacity, 1 cubic meter).

Private car owners: Tropical Oil Company, 15 tank cars (capacity, 6,200 gallons).

Territory served.—This line is the main artery of transportation in the Department of Antioquia. Preliminary surveys prerequisite to construction of a new branch line which will connect the Antioquia Railway with the La Dorada Railway are under consideration.

Antioquia Railway—Traffic Statistics

	1943
Total freight carried ....tons..	721,090
Freight ton miles	48,785,730
Freight train miles	(1)
Average freight rate per ton mile (9.7 centavos)	[2] $.554
Passengers carried	2,559,933
Passenger miles	48,955,929
Passenger train miles (mixed trains widely used)	(1)
Average passenger fare per passenger mile (1.8 centavos)	[2] $0.01
Operating revenue, P 5,482,331.49	[2] $3,132,761
Operating expenses, P 3,359,033.94	[2] $1,919,447
Other expenses, P 4,732,822.82	[2] $2,704,470

[1] Not available.
[2] United States currency.

CALDAS RAILWAY. Address: Manizales, Department of Caldas, Colombia.

Length: Main line, 111 kilometers; branches and sidings, 12 kilometers. Gage: 0.914 meters. Minimum curve radius: 71.85 meters. Maximum curvature: 16°. Maximum gradient: 3 percent. Bridges: 5 bridges; 4 of 40 meters, 1 of 72 meters. Tunnels: None. Clearance: Limited to 2.7 meters. Rails: 77 percent of the rails are 55 pounds per yard; 23 percent are 60 pounds per yard; all are in 9 and 10 yard sections. Cross ties: Heavy wood spaced 1,550 per kilometer or 14 for every 10 yards of rail. Brakes: Hand brakes and compressed air system. Signaling method: Flags and colored lamps.

Repair shops: Located at Manizales and Armenia. There are no roundhouses, power plants or classification yards. About 60 percent of the construction is done in railway-owned workshops, principally in wood as most of the other material is imported. Classification of freight carried: Agricultural and manufactured goods. Employees: 457 employees and laborers (all Colombian).

Equipment (1945): Steam locomotives, 13 each with 220 tons traction power (locomotives are used alternatively with 6 in service daily); motor rail cars, 1; boxcars, 66 (capacity, 25 metric tons); cattle cars, 14 (capacity, 25 head full grown); gondola cars, 27 (capacity, 20 metric tons); platform cars, 11 (capacity, 25 metric tons); passenger cars, 23 in operation, 8 not in service (capacity, 50 passengers); baggage cars, 2.

This line is in dire need of locomotive and passenger car replacements as the rolling stock is in very poor condition, most of the equipment being rather antiquated.

Territory served.—This trunk line serves the main agricultural districts between Manizales (the capital of Caldas) and Cartago, the former of which connects with the railway to Medellin and the latter with Cali, thereby giving service between the capital of the Department and the port of Buenaventura via the Pacific Railway.

Caldas Railway—Traffic Statistics

	1944
Freight ton kilometers	10,523,430
Freight train kilometers	103,460
Average freight rate per ton kilometer	P 0.06190
Passengers carried	859,296
Passenger kilometers	28,107,750
Passenger train kilometers	113,071
Average passenger fare per passenger kilometer	P 0.01171
Operating revenue	P 982,299.06
Other revenue	P 88,667.50
Operating expenses	P 831,473.87
Other expenses	P 26,519.65

Digitized by Google

The following figures show expenditures for maintenance of rolling stock and equipment for the Caldas Railway:

1941	P 54,000.00
1942	P 60,000.00
1943 (estimated)	P 84,000.00

Expenditures in maintenance of right-of-way were as follows:

1941	P 76,820.00
1942	P 53,243.10
1943 (estimated)	P 90,000.00

Private Railways

Address: See individual railway data for official address.
Ownership: Each line owned by a private company.
Purchases: See individual line for purchase information.

Name of railways	Nationality	Length, main line (Kilometers)	Total trackage (Kilometers)
Colombian Petroleum Company.	United States	2.50	2.50
Cucuta Railway Company	Colombian	62.00	67.00
La Dorada Railway Company	British	112.00	112.00
Santa Marta Railways Company, Limited.	United States	94.14	94.14
Total kilometrage		270.64	275.64

COLOMBIAN PETROLEUM COMPANY RAILWAY. Address (Main): Texas Corporation, Chrysler Building, New York, N. Y.; (Local): Colombian Petroleum Co., Cucuta, Colombia. Ownership: Owned jointly by the Texas Corporation and the Socony Vacuum Oil Co.

Length: 2½ kilometers. Gage: 0.914 meters. Weight of rail: 30 pounds per yard. Equipment (1945): Motive power, one, 18-ton Vulcan gasoline locomotive; rolling stock, no freight or passenger cars; all rolling stock, except for one locomotive that runs over this track, belongs to the Cucuta Railway Company.

Operation

Early in 1942, the Colombian Petroleum Co. decided to suspend operation of its railway, except for a 2½ kilometer spur from Puerto Leon on the Zulia River to its junction with the Cucuta Railway. This action was deemed advisable because restricted operations in the oil field in the Petrolea area did not warrant the high expense of maintenance of the railroad. In addition, an automobile road has been constructed which does away with the necessity for the railway.

CUCUTA RAILWAY COMPANY (Cia. del Ferrocarril de Cucuta). Address: Department de Santander del Norte, Cucuta, Colombia. Purchasing method: All purchases are made directly from suppliers.

Length: Main line, 62 kilometers; total trackage, 67 kilometers. Gage: 1 meter. Rails: 66 percent of the rails weigh 40 pounds per yard; 34 percent weigh 50 pounds per yard; all in sections 9 and 10 yards long. Cross ties: 1.8 x 0.20 x 0.11 meters spaced 60 centimeters on centers; all of native hardwood. Bridges: 18. Tunnels: None. Minimum curve radius: 100 meters. Maximum gradient: 2.25 percent. Signaling method: Flags and colored lamps.

Equipment (1945): Steam locomotives, 20; passenger cars, 20 (capacity, 50 passengers); freight cars, 106; autoferros, 2 (capacity, 10 passengers).

Repair shops: Located at Cucuta. Classification of freight: Agricultural produce. Employment: Colombians, 237; foreigners, 21; total, 258. Capitalization: Private stock company, P 1,800,000 (U. S. $1,028,570), divided into 18,000 shares.

Territory Served

This railroad traverses relatively flat, even terrain devoted to agricultural pursuits, serving the territory between Cucuta (capital of the Department of Santander del Norte) and Puerto Leon on the Zulia River, where it joins the Venezuelan Tachira railway which runs to the Catumbo river port of Encontrados, 100 kilometers to the north where there is river connection with Lake Maracaibo.

Condition of the Railroad

The railroad is in poor condition and has been declining for several years. It is not a financially profitable enterprise. The company's equipment is old and deteriorated. Passenger service in particular is poor and uncomfortable. Suggestions have been made to have this line absorbed by the Venezuelan Railroad Company (a firm operating a continuance in Venezuela) or abandon the line and have the Department build a highway on the roadbed.

Cucuta Railroad Company—Traffic Statistics

	1944
Total freight carried ..... tons..	44,482
Freight ton-kilometers	2,280,029
Freight train-kilometers	83,515
Average freight rate per ton-kilometer	P 0.1083
Passengers carried	193,870
Passenger-kilometers	6,887,074
Passenger train-kilometers	37,521
Average passenger fare per passenger kilometer	P 0.0135
Operating revenue	P 361,369.43
Other revenue	P 6,485.72
Operating expenses	P 300,123.11

LA DORADA RAILWAY COMPANY. Address (Main): Dashwood House, 69 Old Broad Street, London, E. C. 2, England; (Local): Ferrocarril de La Dorada, Mariquita, Department of Tolima, Colombia. Ownership: Limited liability company located in London with a majority of English stockholders. Purchasing method: All purchases are made through the main office.

Length: 112 kilometers. Gage: 0.914 meters. Rails: Vignoles type, 50 pounds per yard. Cross ties: There are about 15,000 steel sleepers laid in the first 4 kilometers of line out of La Dorada and about 170,000 wooden sleepers (Guayacan-lignum vitae or Cumula) purchased locally, 50 pounds per yard, vignoles type. Bridges: 19. Tunnels: None. Minimum curvature: Main line, 100 yards radius; sidings, 60 yards radius. Maximum gradient: 2 percent. Brakes: Various, including Westinghouse air system. Clearance: 11′ 8″ x 10′ 7″.

Signaling method: Telephone and train staff apparatus (the withdrawal of a staff from the apparatus to be handed to driver closes the circuit on section, preventing withdrawal or corresponding staff at the other station). Classification of freight: Petroleum products, coffee, spirits, and cement.

Repair shops: Located at Mariquita for maintenance of locomotives. Power plants: Small electric light and ice plant for local company needs located at Mariquita. Classification yards: Limited to sidings at main stations.

No bus and truck route is operated by this line, but there is regular service in conjunction with trucks on Cambao-Bogota highway and Manizales-Mariquita route. Employees: 364.

Equipment (1945): Locomotives, 12; passenger cars, 16; baggage cars, 1; motor rail cars, 4; freight cars, 140 (84 box, 7 gondola, 21 flat, 1 tank for fuel,[1] 12 convertible cattle, 15 nonconvertible cattle). Capitalization: £604,347[2] (invested).

Territory Served

This line serves the territory between La Dorada on the Magdalena river in the Department of Caldas and Abalema, Department of Tolima, forming an important link via the Magdalena river in the central part of Colombia, and with the Pacific coast via the Departmental Railway (Abalema-Ibague) and the National Railway (Pacific) to Buenaventura.

La Dorada Railway Company—Traffic Statistics

Total freight carried in 1944...tons..	244,932
Ton-kilometers (1943)	18,991,568
Train-miles (engine-miles) (1943)	203,007
Average freight rate per ton-kilometer (1943)	P 0.06
Passengers carried (1943):	
First class	25,545
Third class	342,893
Government	1,781
Passenger-kilometers (1943)	10,319,392
Passenger train-kilometers (no trains run exclusively for passengers)	
Average passenger fare per passenger-kilometer (1943)	P [1] 0.01½
Operating revenue (1943)	P 1,363,305.00
Operating expenses	P [2] 801,605.00

[1] Approximate.
[2] Excludes such items as depreciation, interest, et cetera.

SANTA MARTA RAILWAY COMPANY, LIMITED (Arrendataria del Ferrocarril Nacional de Magdalena). Address (Main): 1 Federal Street, Boston, Mass.; (Local): Santa Marta, Colombia.

Ownership: The Santa Marta Railway Company, an American company constituted in the United States, has leased the Ferrocarril Nacional de Magdalena from the Colombian Government. The lease is for 30 years and expires in 1962. Purchasing method: All purchases are made through the Boston office.

[1] Tropical Oil Co. runs its own tank cars over this line.
[2] The pound sterling has an average value of $4.035 U. S. currency.

Digitized by Google

Length: Total trackage, 94.14 kilometers. Gage: 0.914 meters. Maximum curvature: 7° 8′. Maximum gradient: 3 percent. Rails: American and English rails are used, 60 pounds per yard in sections 9 and 10 yards long. Cross ties: Native hardwood and imported southern pine 6″ x 8″ x 7′. Bridges: 2, average length 183 meters. Tunnels: None. Clearance: On bridges, height—15′ 10″; width—13′ 9″.

Repair shops: Located at Santa Marta and Cienaga. The workshops are used only for general repairs and assembling. Classification of freight: Bananas, rice, and general merchandise.

Equipment (1945): Fuel oil locomotives (owned and leased), 12 in operation, 19 not in operation; passenger cars, 30; baggage cars, 5; motor rail cars, 41; boxcars, 73; flat and gondola, 57; tank cars (fuel), 4; tank cars (water), 6; fruit cars, 379; miscellaneous, 26. Employees (1945): 588. Routes and termini: Santa Marta to Fundacion.

Territory Served

This line operates through a low, sandy plain skirting the Santa Marta mountain range serving the banana zone on the Atlantic coast between Fundacion, Cienaga and Santa Marta. This line, rented from the National Railways, has virtually suspended operations, since the banana-growing industry in this area is almost nonexistent today. All branch lines running to the main line belong to the United Fruit Company and are operated as a part of the Santa Marta Railway Company.

Santa Marta Railway Company, Limited—Traffic Statistics

	1944
Total freight carried .....tons..	103,536
Freight train miles	24,014
Freight ton miles	2,955,525
Average freight rate per ton mile	[1] $0.0396
Passengers carried	831,314
Passenger miles	16,584,273
Passenger train miles	59,031
Average passenger fare per passenger mile	[1] $0.072
Operating revenue .....[1]	$301,529.82
Other revenue .....[1]	$40,196.32
Operating expenses .....[1]	$349,177.02
Other expenses .....[1]	$276,378.41

[1] United States currency.

Common Carriers—Street Railways

Address: See individual railway data for official address.
Ownership: Each line is municipally owned.
Purchases: All purchases are made through municipal office.

Name of railways	Route length, main line (kilometers)	Gage (meters)
Bogota Street Railway ..	59.69	1.00
Medellin Street Railway ..	45.00	0.914
Pereira Street Railway ..	6.00	0.914
Total kilometrage ..	110.69	

BOGOTA STREET RAILWAYS (Tranvia Municipal de Bogota). Address: Calle 26, No. 13-B-60, Bogota, Colombia.

Length: Total trackage, all electrified, 59.69 kilometers. Usual radii: 15.30 meters and 60 meters. Maximum gradient: 2.8 percent. Ballast: Hard rock. Rails: Vignola rails of 60 to 82 pounds per yard in 9 and 10-yard sections. Cross ties: Very good quality of wood, 1.80 x 0.20 x 0.15 meters.

Signaling method: Electric automatic semaphores and traffic policemen. Repair shops: Power substations, yards, repair shops, are all located in Bogota. Service: 24 hours a day. Employees (1945): 890, all Colombian.

Equipment: 114 cars of various types and capacity, closed and open. Length of bus and truck routes: It is planned to combine bus and street car service as soon as equipment is accessible.

Traffic statistics (1944): Passengers carried, 43,448,358; income from fares, P 2,167,998.37; income from other sources, P 18,788.58; expenses of operation, P 1,756,827.85; passengers per car kilometer in 1940, 4.8; fare, except for a small percentage of riders, 5 centavos.

MEDELLIN STREET RAILWAY (Tranvia Municipal de Medellin). Address: Medellin, Colombia.

Length: Total trackage—all electrified—45 kilometers. Construction since 1940: No new track except for minor loops and few changes. Maximum curvature: 20 meters. Maximum gradient: 9 percent. Ballast: Crushed rock. Rails: 45, 55, 74, and 98 pounds per yard. Cross ties: Hardwood, 6 feet long. Service: Continuous car service is maintained from 5 a. m. to 9 p. m. daily. Employees: 315.

Equipment (1945): Trolleys, 45 in operation, 16 not in operation; electric buses, 4 in operation, 2 not in operation. The equipment is obsolete and in a dilapidated condition, most of it being over 20 years old. There are plans for scrapping the whole system, or a large part thereof, replacing it by new electric buses as soon as facilities are available.

Repair shops: The company maintains a repair shop in Medellin, for mechanical work, carpentry, and painting.

Capitalization (1944); P 2,881,219.06 ($1,646,410.89); depreciation, P 168,000.00 ($96,000.00) begun in 1938. Traffic statistics (1944): Passengers carried, 14,091,712; passenger fares, 5 centavos (for students of Municipal schools, 2 centavos); operating revenue, P 693,868.40 ($396,496.23); other revenues, P 14,063.93 ($8,035.53); operating expenses, P 522,839.42 ($298,796.24); other expenses, P 5,068.74 ($2,896.42).

PEREIRA STREET RAILWAY (Compania de Tranvia de Pereira). Address: Compania de Tranvia de Pereira, Department of Caldas, Colombia.

Length: 6 kilometers. Rails: 45 pounds per yard in 9 and 10-yard sections. Equipment: Passenger cars, 9. Trolley volts: 600. Power plant: Hydroelectric (General Electric); capacity, 360 KW (2 units). Passengers carried in 1929[1], 951,245. Approximate capital invested: $500,000.[2]

[1] Latest figures available.
[2] All data regarding this road are very old—most recent are 1930.

Cableways

Address: See individual cableway data for official address.
Ownership: National Government.[1]
Purchases: All purchases are made through El Consejo Administrativo de los Ferrocarriles Nacionales, Bogota, Colombia.

Name of cableways	Route length (kilometers)
Cable Aereo de Gamarra-Ocana	47
Cable Aereo de Mariquita-Manizales[1]	72
Total cableways	119

[1] Law No. 4 of Feb. 19, 1945, authorized the National Government to purchase the La Dorada Railroad and aerial cable from Mariquita to Manizales.

CABLE AEREO DE GAMARRA-OCANA. Address (Main): El Consejo Administrativo de los Ferrocarriles Nacionales, Bogota, Colombia; (Local): Ocana, Department of Norte de Santander, Colombia.

Length: 47 kilometers. Number of stations: 10. Equipment (1942): Motors, 8; total force in horsepower, 512; passenger cars, 48; total passenger capacity, 282; freight cars, 512; total tonnage capacity, 256.

Traffic statistics (1940): Revenue passengers carried, 17,783; nonrevenue passengers carried, 895; ton-kilometer of revenue freight carried, 410,659; ton-kilometer of nonrevenue freight carried, 7,593; revenue and income, P 95,410; expenses, P 90,338.

Territory served.—This cable connects the town of Ocana in the Department of Norte de Santander with the town of Gamarra and the Magdalena River in the Department of Magdalena. Ocana has no other transportation outlet capable of transporting passengers and freight now carried by the cable.

CABLE AEREO DE MARIQUITA-MANIZALES (Ropeway Division, La Dorada Railway Company). Address (Main): El Consejo Administrativo de los Ferrocarriles Nacionales, Bogota, Colombia; (Local), Mariquita, Department of Tolima, Colombia.

Length: 72 kilometers. Number of stations: 4. Equipment (1940): Motors, 9; total force in horsepower, 450; passenger cars, none; freight cars, 769; total tonage capacity, 190.

Traffic statistics: Ton kilometers of revenue freight, 2,160,883; revenue and income, P 163,743; expenses, P 208,457.

Territory served.—This cable connects the Magdalena River Valley with the Cauca River Valley, running from Mariquita, a Magdalena Valley town on the La Dorada Railway in the Department of Tolima to Manizales in the Department of Caldas, at which place it connects with the Caldas Railway which leads to the Cauca River Valley. Though there is a highway now connecting Mariquita and Manizales, the cable remains of some importance for the transportation of freight.

Digitized by Google

Railroads No Longer In Operation

Barranquilla Railway ..... Ceased operation in 1938.

Carare Railway (Ferrocarril de Carare) ..... Ceased operation November 1935.

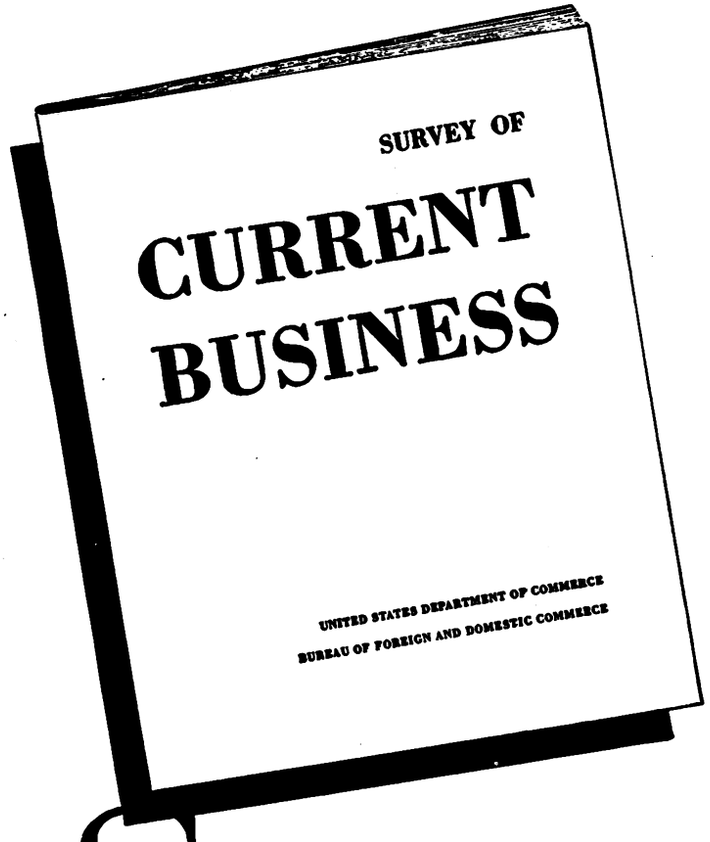
Central of Bolivar ..... Ceased operation in 1934.

Colombian Petroleum Company Railway ..... Early in 1942, the Colombian Petroleum Company decided to suspend operation of its railway, except for a 2½ kilometer spur from Puerto Leon on the river Zulia to its junction with the Cucuta railway.

Northern Cableway (Northern of Caldas Aerial Cableway) (Empresa de los Cables Aereos Departmentales) (Seccion del Norte) (Government-owned, Departmentally operated) ... Ceased operation August 31, 1940.



Digitized by Google



$2.00
per year

SURVEY OF CURRENT BUSINESS

THIS AUTHORITATIVE MONTHLY PERIODICAL makes easily available to businessmen over 2,200 comprehensive facts about production, stocks, orders, prices, sales, shipments, etc., of the industries of the United States by means of text, tables, charts, and index numbers.

A sample copy will be sent, on request to the
Bureau of Foreign and Domestic Commerce,
Washington, D. C.

$2.00 per year, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Digitized by Google

Field Offices

JOSEPH A. MACK, *Director*

Field offices are maintained by the Commerce Department in the following 26 leading cities to assist businessmen in their current domestic and foreign trade problems:

Location of Offices	*Managers*
Atlanta 3, Ga., 603 Rhodes Bldg.	*C. Parker Persons*
Boston 9, Mass., 1800 Customhouse	*Harold P. Smith*
Buffalo 3, N. Y., 242 Federal Bldg.	*John J. Love*
Charleston 3, S. C., Chamber of Commerce Bldg.	*C. W. Martin*
Chicago 4, Ill., 357 U. S. Courthouse	*George C. Payne*
Cincinnati 2, Ohio, Chamber of Commerce	*Miss Emma Herier*
Cleveland 14, Ohio, 753 Union Commerce Bldg., Euclid Ave., at East 9th St.	*Frederic L. Roberts*
Dallas 2, Tex., Chamber of Commerce Bldg.	*Carl F. Bartz*
Denver 2, Colo., 566 Customhouse	*Mrs. Elizabeth Pettus*
Detroit 26, Mich., 1028 New Federal Bldg.	*Richard Stephenson*
Houston 14, Tex., 603 Federal Office Bldg.	*Thos. U. Purcell*
Jacksonville 1, Fla., 425 Federal Bldg.	*William A. Dunlap*
Kansas City 6, Mo., 724 Dwight Bldg.	*Harry M. Washington*
Los Angeles 12, Calif., 1540 U. S. Post Office and Courthouse	*Walter Measday*
Memphis 3, Tenn., 229 Federal Bldg.	*Noland Fontaine*
Minneapolis 1, Minn., 201 Federal Bldg.	*Silas M. Bryan*
New Orleans 12, La., 408 Maritime Bldg.	*Harold C. Jackson*
New York 6, N. Y., 61 Broadway, 5th Floor	*John F. Sinnott*
Philadelphia 2, Pa., 1510 Chestnut St.	*William M. Park*
Pittsburgh 19, Pa., 1013 New Federal Bldg.	*Chas. A. Carpenter*
Portland 4, Oreg., Room 313, 520 S. W. Morrison St.	*Howard Waterbury*
Richmond 19, Va., Room 2, Mezzanine, 801 E. Broad St.	*C. Roy Mundee*
St. Louis 1, Mo., 107 New Federal Bldg.	*Clyde Miller*
San Francisco 11, Calif., 307 Customhouse	*John J. Judge*
Savannah, Ga., 513 Liberty National Bank and Trust Bldg., Bull and Broughtin Streets	*Joseph C. Stovall*
Seattle 4, Wash., 809 Federal Office Bldg.	*Philip M. Crawford*

Digitized by Google

Domestic Commerce

written for

BUSINESSMEN . .

• Here is an authoritative monthly periodical written in the language of the American businessman. It is one of the principal organs of the Department of Commerce for disseminating information deemed of importance in maintaining a vigorous and dynamic free enterprise system.

• Domestic Commerce gives the reader an understanding of the progress and changing conditions of industry and business of the United States. Its writers are officials of this and other Government agencies, and specialists in the various subjects covered.

• Particular attention is given to developments in the field of post-war planning.

{ *A sample copy will be sent you upon request to the Bureau of Foreign and Domestic Commerce, Washington 25, D. C.* }

$1.00 per year . . . from the Superintendent of Documents

U. S. GOVERNMENT PRINTING OFFICE • WASHINGTON 25, D. C.

☆ U. S. Government Printing Office: 1946—678333

Digitized by Google

Documents Room

Industrial Reference Service

U. S. DEPARTMENT OF COMMERCE, HENRY A. WALLACE, *Secretary*
Bureau of Foreign and Domestic Commerce, AMOS E. TAYLOR, *Director*

INDIANA UNIVERSITY
MAR 15 1946
LIBRARY

Part 1. TRANSPORTATION and PUBLIC UTILITIES

Available in Parts Covering Selected Services and Commodities
Annual Subscription $1.50. Price this report 5 cents
For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., or any of the Department's Field Offices

Volume 4—Part 1 | February 1946 | Number 3

Madagascar's Electric and Water Supply Systems

Prepared by Transportation Unit, James C. Nelson, Chief

Based on a report by Clifton R. Wharton, United States Consul, Tananarive and other consular reports

Prepared by Guida Berrigan Hall, Transportation Unit

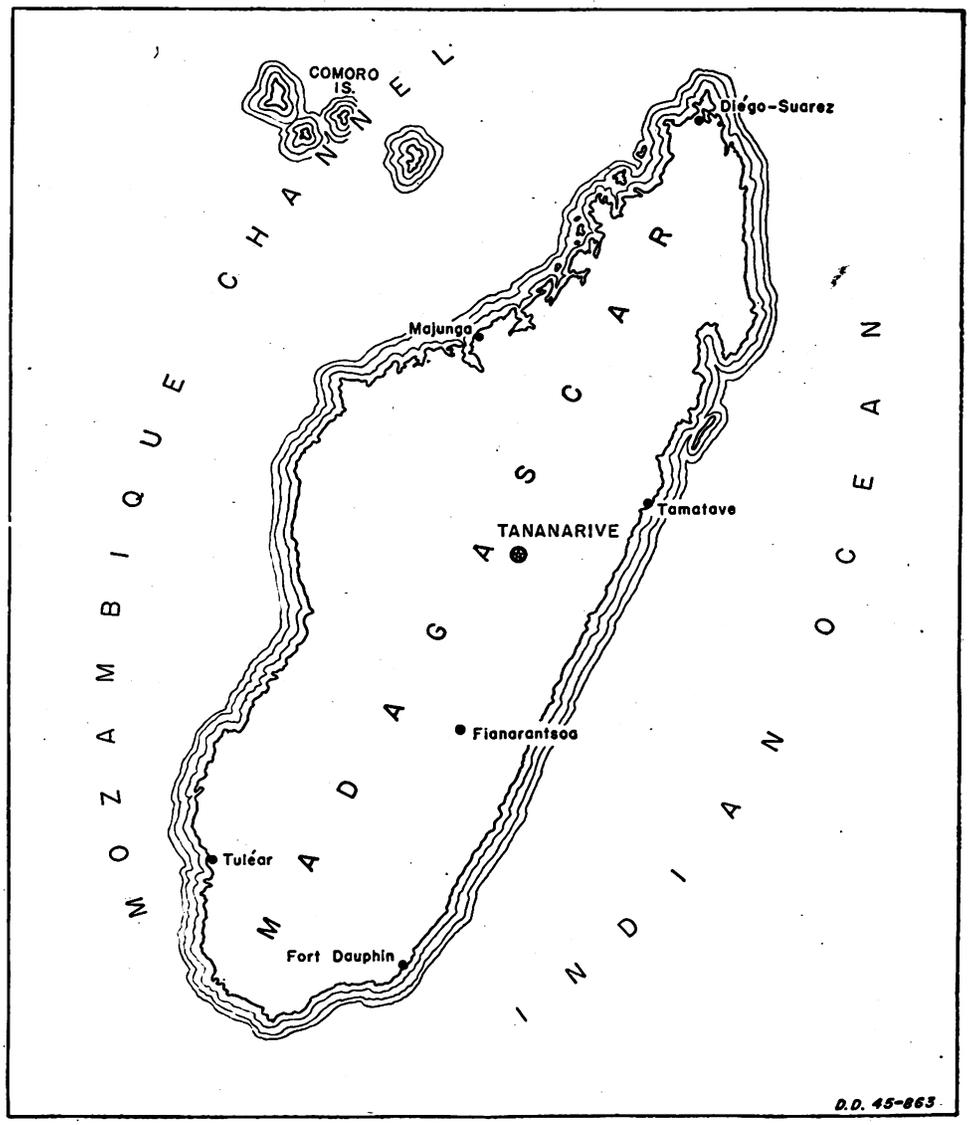
The many rivers and waterfalls of Madagascar make hydroelectric power the most readily available and the principal source of electric energy on the island.

Madagascar is one of the largest islands in the world, and together with its dependencies, the Comoro islands, covers 241,000 square miles, which is slightly smaller than the area of Texas. It is a French colony lying in the Indian Ocean almost entirely within the tropics. The Mozambique Channel, which is 240 miles wide at its narrowest point, separates Madagascar from the Continent of Africa.

The principal activities of the 3,797,936 inhabitants (census of 1936) are farming, cattle raising, and the gathering of forest products. The majority of the population live in small villages and less than 10 percent live in towns of 1,000 or more inhabitants. The manufacturing industries on the Island are relatively small and few in number. The language is Malayo-Polynesian except in the northwestern part of the Island, where Bantu is spoken.

Madagascar is mountainous with the exception of the broad Sakalava Plain which forms about one-third of the western part of the Island, and the narrow eastern coastal plain.

Tananarive, located near the central part of the Island at an altitude of 4,500 feet, is the capital and largest city. In 1936, it had a population of 119,823. Other large inland cities of Madagascar are Ansirabe and Fianarantsoa with 18,215 and 14,740 popula-



L 12083
Digitized by Google

tion, respectively, in 1936. The important port cities and their populations are Tamatave (21,421), Majunga (23,684), Tulear (15,180), Fort Dauphin (4,463), Diego-Suarez (15,012), and Manakara (5,277).

Electric Supply System

Because of the numerous rivers and waterfalls and the lack of coal resources, hydroelectrically generated energy predominates on the island, and the first hydroelectric plant was constructed in Madagascar in 1907 near the city of Tananarive. In 1927, the second waterfall was harnessed and the electrification of Tamatave was commenced by Electricité et Eaux de Madagascar, a subsidiary of the original French company, Energié Industrielle. Within the next few years, this company constructed the electric systems of the cities of Antsirabe, Fianarantsoa, and Majunga, and the water supply systems for the towns of Tamatave and Majunga.

Individuals and certain industrial companies own and operate the electric power plants which supply the electric energy for the cities of Diego Suarez, Mananjary, Maevatababa, Soavinandriana, and Ambohimahasoa.

In spite of the fact that electricity has been available since 1931 in the railway shops in Moramanga and Manakara, the electrification of the railroads has not been accomplished.

Electric Current Characteristics

All electric current supplied in Madagascar is alternating current, 3 phase, 50 cycles. The voltages vary in different towns, and such information is given in the accompanying tabulation of the electric current characteristics for the towns on the Island.

Regulations

The control of electrical installations is regulated by the decree of November 24, 1938, of the President of the French Republic, promulgated in the Colony of Madagascar by the order which appeared in the Colony's Journal Officiel of January 21, 1939. The laying of wires is regulated by the order of April 28, 1939, of the Governor General of Madagascar and Dependencies.

The bayonet type of socket is used for power up to 150 watts, and the Edison and Goliath types of screw sockets are employed for power above 150 watts.

Rates for Electricity

The cost of electric current varies in different localities on the island, but the average price of a kilowatt-hour is: Lighting, Frs. 3.436; industrial Fr. 1,819 to Fr. 1.919 for low tension and Fr. 0.793 to Fr. 0.933 for high tension; and household appliances, on monthly contract basis, minimum Frs. 115.00, maximum Frs. 500.00.

Power Plants of Tananarive

The two generating plants supplying electricity to Tananarive are located 13 miles from that city at Antelomita Falls on the Varahine river. At the time these hydroelectric plants were built, the volume of water available was very irregular. However, the construction of the Mantasoa dam farther up the river so regulated the flow that 350 cubic feet of water per second are readily available throughout the dry season.

The first plant, known as Plant No. 1, built between 1907 and 1909, generates 3-phase current with 2,000 volts between phases, which are raised to 20,000 volts by alternators of 600-kv.=a. The generators consist of 3 units which include 750 horsepower turbines and alternators of 600-kv=a.

The volume of water in Plant No. 1 varies from 350 to 8,000 cubic feet per second, according to the season, and the gross power generated reaches 1,500 horsepower. The water is held in a dam 558 feet long and which has a drop of 60 feet. There are two sluices having a capacity of 645 cubic feet each per second, and the water is diverted by an intake channel 590 feet long. Half of this length is tunneled through solid rock and fed by a special set of sluices at one end of the dam.

Plant No. 2, which is located near Plant No. 1, was built in 1927-30. It has a capacity of 4,500 horsepower and the volume of water is 700 cubic feet per second. The water for this plant is backed up to the exit of Plant No. 1, and the dimensions of the dam are 820 feet long and 60 feet from crest to level.

The generator system of Plant No. 2 consists of two vertical shaft units, comprising 2,100 horsepower and turbines and alternators of 1,700-kv.=a. The 3-phase current of 5,000 volts generated by this plant is stepped up to 20,000 volts for transmission.

Both plants, No. 1 and No. 2, operate continuously in parallel.

A 20,000-volt transmission line carries the electricity from these plants for a distance of 16 miles. An interrupter station is located about midway on the line, and about 2½ miles from Tananarive a branch wire runs to the nearby Mondroseza pumping station. At the transformer station located east of the town, the current is stepped down to 5,000 volts and from there five 3-phase feeder lines radiate to the following distribution points: 2 to the center of the town, 2 to the suburbs, and 1 to the outer area. A 20,000-volt line supplies the current required for the operation of the radio station at Alarobia. The total length of the transmission lines exceeds 77 miles.

The transformer stations within the city of Tananarive reduce the voltage from 5,000 to 110/220 volts, 50 cycles for domestic and industrial consumption.

In 1920, there were 1,700,000 kilowatt-hours of electricity consumed in the city of Tananarive. The consumption increased to 6 million kilowatt-hours in 1930, and this figure was doubled in 1944 when 12 million kilowatt-hours of electric current were used.

The 2,000-kilowatt capacity of the power installations in Tananarive in 1920 was increased to 12,000 kilowatts by 1931. Plans for the expansion of the installed capacity to approximately 70,000 kilowatts were abandoned because of the war and subsequent shortage of materials.

Fianarantsoa

Two 215 horsepower turbines and alternators of 176-kv.=a. generate the electricity supply for the town of Fianarantsoa. The 220-volt current is stepped up to 20,000 volts for transmission and a substation reduces this high voltage to 5,000 volts. Transformers installed in the town further reduce the voltage to 120/208 volts, 50 cycles, 3 phase for domestic consumption.

Antsirabe

The generating equipment supplying electric energy to the town of Antsirabe consists of two 775-horsepower turbines and alternators of 600-kv.=a. capacity. The 2,000-volt current is raised to 20,000 volts for transmission and is subsequently reduced to 5,000 volts at the substation. The voltage is further stepped down by transformers in the town to 120/208 for domestic consumption and is supplied at 50 cycles, 3-phase.

Tamatave

In Tamatave the electric current is generated by two 2,200-horsepower turbines and alternators of 1,900 kv.=a. capacity. For transmission the 5,000-volt current is stepped up to 20,000/35,000 volts and reduced to 5,000 volts in a substation which is equipped with two 350-horsepower Diesel engines for emergency use. The current supplied to consumers is 3-phase, 50 cycles, 120/208 volts.

Majunga

The electricity supply for the town of Majunga is generated in a Diesel-operated central, which has two 260-horsepower and two 775-horsepower Diesel engines and alternators. The current supplied for domestic consumption is 50 cycles, 115/200 volts.

Digitized by Google

Water Supply Systems

Tamatave

The drinking water for the town of Tamatave is supplied by the Farafaty plant, from the Ivondro river.

The pumping station is equipped with four electric pumps, and has facilities for the erection of two additional pumps whenever they are needed.

The water, after being pumped, is clarified, filtered and treated by means of solutions of alumia sulphate and chloride of lime, after which it is stored in a 3,000 cubic meter reservoir on Farafaty hill. The water is distributed to the city through approximately 4½ miles of pipe.

The electric power for the operation of the water works is supplied at 5,000 volts by the Tamatave electric system. An apparatus which indicates the water level makes it possible at any time to determine at the electric substation the level of the water in the reservoir.

Tananarive

Lake Mandroseza, located between 3 to 5 miles from the city of Tananarive, on the right bank of the Ikopa river, is the source of the water supply for that city. The equipment of the water works is as follows:

1. A station equipped with two groups of turbo-pumps, raising 22,945 cubic feet of water per hour from the Ikopa River to Lake Mandroseza, which acts as a clarification bed.

2. A station equipped with four groups of turbo-pumps to raise the water from the lake to the prefiltering station; three of the pumps raising 22,945 cubic feet of water per hour, each, and the fourth, 10,590 cubic feet per hour.

3. A set of prefilters, capable of filtering 353,000 cubic feet of water daily.

4. A station equipped with five groups of turbo-pumps, each pump raising 9¼ gallons per second of prefiltered water to the filter chambers.

5. A filter chamber equipped with three batteries of Desrumeaux filters where the water is filtered and treated with aluminum sulphate and calcium chloride before it is distributed to the town.

6. A station equipped with five groups of turbo-pumps to force upward under a pressure of 561 feet the filtered water into the reservoirs of the distribution system; three of the pumps raising each 4,412 cubic feet of water per hour, and 2 raising 8,825 cubic feet of water each per hour.

There are four reservoirs in the town's water distribution system. The highest is located at an altitude of 4,770 feet, and has a capacity of 2,210 cubic feet. Two reservoirs are located at an altitude of 4,580 feet and together hold 84,700 cubic feet of water. The capacity of the fourth reservoir is 42,460 cubic feet and it is located at an altitude of 4,460 feet. Each of these reservoirs feeds a separate distribution system which is necessitated by the great differences of altitude in the town. The hydrants are the Bayard antiwaste type.

Electricity Supply of Madagascar

Town	Company	AC or DC	Phase	Cycles	Voltage	Prime mover
Ambohimahasoa	M. Marcel Laborde (Pvt.)	AC	3	50	110	Hydro
Antsirabe	Ste. Electricite et Eaux de Madagascar	AC	3	50	120/208	Hydro
Diego-Suarez	Ste. d'Electricite et d'Entreprises a Madagascar. (Pvt.)	AC	3	50	115/200	Steam
Fianarantsoa	Ste. Electricite et Eaux de Madagascar	AC	3	50	120/208	Hydro
Majunga	Ste. Electricite et Eaux de Madagascar	AC	3	50	115/220	Diesel
Mananjary	M. Jules Venot (Pvt.)					
Tamatave	Ste. Electricite et Eaux de Madagascar	AC	3	50	120/208	Hydro
Tananarive	Ste. Electricite et Eaux de Madagascar	AC	3	50	115/200	Hydro

Department of Commerce Field Service

Atlanta 3, Ga., 603 Rhodes Bldg.
Boston 9, Mass., 1800 Customhouse.
Buffalo 3, N. Y., 242 Federal Bldg.
Charleston 3, S. C., Chamber of Commerce Bldg.
Chicago 4, Ill., 357 U. S. Courthouse.
Cincinnati 2, Ohio, Chamber of Commerce.
Cleveland 14, Ohio, 753 Union Commerce Bldg., Euclid Ave., at East 9th St.
Dallas 2, Tex., Chamber of Commerce Bldg.
Denver 2, Colo., 566 Customhouse.
Detroit 26, Mich., 1028 Federal Bldg.
Houston, 14, Tex., 603 Federal Office Bldg.
Jacksonville 1, Fla., 425 Federal Bldg.
Kansas City 6, Mo., 724 Dwight Bldg.
Los Angeles 12, Calif., 1540 U. S. Post Office and Courthouse.
Memphis 3, Tenn., 229 Federal Bldg.
Minneapolis 1, Minn., 201 Federal Office Bldg.
New Orleans 12, La., 408 Maritime Bldg.
New York 6, N. Y., 61 Broadway, 5th Floor.
Philadelphia 2, Pa., 1510 Chestnut St.
Pittsburgh 19, Pa., 1013 New Federal Bldg.
Portland 4, Oreg., Room 313, 520 S.W. Morrison St.
Richmond 19, Va., Room 2, Mezzanine, 801 E. Broad St.
St. Louis 1, Mo., 107 New Federal Bldg.
San Francisco 11, Calif., 307 Customhouse.
Savannah, Ga., 513 Liberty National Bank and Trust Bldg., Bull Broughtin Sts.
Seattle 4, Wash., 809 Federal Office Bldg.

☆U. S. GOVERNMENT PRINTING OFFICE: 1946—679533—107

Digitized by Google

Domestic Commerce

written for

BUSINESSMEN . .

● Here is an authoritative monthly periodical written in the language of the American businessman. It is one of the principal organs of the Department of Commerce for disseminating information deemed of importance in maintaining a vigorous and dynamic free enterprise system.

● Domestic Commerce gives the reader an understanding of the progress and changing conditions of industry and business of the United States. Its writers are officials of this and other Government agencies, and specialists in the various subjects covered.

● Particular attention is given to developments in the field of post-war planning.

{ *A sample copy will be sent you upon request to the Bureau of Foreign and Domestic Commerce, Washington 25, D. C.* }

$1.00 per year . . . from the Superintendent of Documents

U. S. GOVERNMENT PRINTING OFFICE • WASHINGTON 25, D. C.

Digitized by Google

Documents Room

Industrial Reference Service

U. S. DEPARTMENT OF COMMERCE, HENRY A. WALLACE, *Secretary*
Bureau of Foreign and Domestic Commerce, AMOS E. TAYLOR, *Director*

Part 1. TRANSPORTATION and PUBLIC UTILITIES

Available in Parts Covering Selected Services and Commodities
Annual Subscription $1.50. Price this report 5 cents
For sale by the Superintendent of Documents, Government Printing Office, Washington 25, D. C., or any of the Department's Field Offices

Volume 4—Part 1 | February 1946 | Number 4

MAR 21 1946

Power Facilities of the British West Indies and the Bermuda Islands

Prepared in the Transportation Unit, James C. Nelson, Chief
Based on reports by Foreign Service officers of the United States stationed in the respective countries
Prepared by Guida Berrigan Hall

Bahamas

The Bahamas, a group of about 3,000 islands, rocks and cays, with a total land surface of over 4,400 square miles, extend from approximately 50 miles south of Miami, Fla., to about the same distance from the coast of Cuba. The climate is subtropical, with the months of June through September usually very hot and humid. During the cooler months, November to April, the temperature ranges from 60 to 80 degrees Fahrenheit, while during the remainder of the year, 75 to 90 degrees Fahrenheit is the average. Approximately 44 inches of rain falls annually and May, June, September, and October are regarded as the wettest months.

The population of the 30 inhabited islands in the Bahamas is about 66,000, of which 85 percent are Negroes. Nassau, the capital and largest city, is on the Island of New Providence and has a population of 20,500 of which 5,000 are white. The English language is used throughout the Colony. Living standards of the native population are low.

The winter tourist trade provides the principal source of income of the Bahamas and sponge fishing is the chief local industry. Other industries in order of importance are tomato growing, small-scale agriculture, fishing, lumbering, and trading.

Fuels and Power

Gas

There are no known sources of coal and natural gas in the Bahamas. However, manufactured gas is imported in 60- and 100-pound cylinders from Florida, and sold at the following rates:

Cylinder	*Rate*
100-pound	£3.15.0 ($15.00)
60-pound	£2.5.0 ($ 9.00)
25-pound	20 cents per pound

At 5 cents per pound, the importer pays an import tax of 20 percent plus a war tax of 5 percent. The transportation cost for the 100- and 60-pound cylinders is $2 each. The 25-pound cylinder is filled locally from the larger sizes. In addition to freight, the other charges involved are $2.50 clearance, plus $5 customs charges in Miami. These charges cover one shipment, regardless of the number of cylinders in a shipment. A summarization of the total cost of importing one 100-pound cylinder of manufactured gas is established as follows:

Item	*Cost*
Cost of one, 100-pound cylinder of gas	$5.00
Freight, Miami-Nassau and return empty	2.00
Bahamas tax	1.25
Charges on shipment clearance in Miami	.37½
Total	$8.62½

The retail price of one cylinder of manufactured gas in Nassau represents about 76 percent profit.

About 250 customers in Nassau and four customers elsewhere in the Islands use this type of gas regularly. In addition an average of 20 cylinders of gas and supplies are furnished annually to boats entering Nassau, which is the only distributing point in the Islands.

Electricity

The Government of the Bahamas has supplied the electricity required in the Islands since 1909. The system was reconstructed in 1922. The Canadian Electrical Code of the Canadian Engineering Standards Association applies throughout the Colony.

Underground cables are used within the city limits, and overhead wires transmit the current in rural areas. Main transmission is at 2,300 volts, 3 phase, 60 cycles, and distribution is 115-220 volts, 3 phase, 4-wire from pole-type substations and overhead construction.

The total generating capacity of the power plant is 2,400 kilowatts, while the total connected load is 5,121 kilovolt-amperes and 1,345 kilowatts is the peak load. Diesel-powered prime movers generate the electric energy, since there are no water power potentials in the Bahamas. The generating equipment in the Nassau power plant is as follows:

PRIME MOVERS
2—300 b. hp. } Worthington Diesel four-stroke engines
2—750 b. hp. }
2—740 b. hp.—Fullager two-stroke engines

ALTERNATORS
2—200 kilowatt } United States manufacture
2—500 kilowatt }
2—500 kilowatt—English Electric Company

New power plant.—On June 17, 1941, a new Diesel-operated electrical generating power plant with a capacity of 800 kilowatts was opened. All equipment for this plant was purchased from British manufacturers.

Consumption of electricity.—Consumption of electricity increases in a good tourist season, and declines during a bad winter season. In 1935, there were 1,979 consumers of electric energy and this figure had increased to 2,964 by January 1, 1940. Table 1 shows the number of consumers and kilowatt-hours of energy generated in the 5-year period 1935-39.

TABLE 1.—*Consumption of Electricity in the Bahamas, 1935-39*

Year	Total number of consumers	Kilowatt-hours generated
1935	1,979	3,679,860
1936	2,215	4,084,240
1937	2,460	4,907,860
1938	2,714	5,337,490
1939	2,964	6,171,160

Digitized by Google

TABLE 2.—*Rates Charged for Electric Current in the Bahamas*

Item	Cost per kw.-hr.	Fixed charge	Meter rent	Minimum	Remarks
Lighting	5d.	Nil	Nil		General
Prepayment	5d.	Nil	Nil		5d per kw.-hr. after 720 kw.-hr. are consumed.
Shop exterior	3d.	Nil	1s. per month		Exteriors only
Domestic	2d.	According to schedule	Nil		Subject to minimum of 1 kw. heating installed
Heating only	2d.	Nil	Nil	10s. per month	1 kw. and over
Heating, Off peak	Winter months 1d. 6	Nil	2s. per month		Time switch controlled
Cooking	Summer months ½d. 6		Nil		Only where off-peak heating is in use
Storage Cookers	3/6 wk.	Nil	Nil		
Power, large users	500 wt. 1d.	Maximum demand according to schedule	2s. per month		5 hp. minimum
Industrial (power and light)	2d.	Power L4 per hp. per annum Lighting 1d. sq. ft. of floor area	Nil	Nil	1 hp. minimum
Bulk supply	1¼d.	L5 per kv.-a. per annum maximum demand	Nil	Nil	High tension only
Air conditioning	½d. 1d.	May to end of October Nov. to end April	2s. per month	Nil	

Electric rates.—Slight alterations were announced in the prevailing electric rates in the Bahamas in 1940. The rates now in force are shown in Table 2.

Barbados

Barbados is the most eastern of the British West Indian islands. It is 21 miles long and 14 miles wide, covering an area of 166 square miles and had an estimated population of 200,674 in 1944. The capital city, Bridgetown, (together with St. Michael) has an approximate population of 70,500.

The climate of Barbados is moderate, with almost constant breezes prevailing.

There are a few small industries in Barbados. The Island's principal commercial activities are the production of sugar cane and the manufacture of sugar, molasses, and rum.

Fuels and Power

Oil

Experiments have been made substantiating the claim of geologists that oil exists in considerable quantities in Barbados. The British Union Oil Company has established some mineral oil wells in the Colony. So far, however, the quantity produced has not been large, though sufficient to make the enterprise profitable.

Gas

Manufactured gas is supplied in Barbados by the Barbados Gas Company Limited, of Bridgetown, a British-owned concern. The area supplied includes the city of Bridgetown and its suburbs, in which there are 475 domestic customers and 50 commercial users. Gas is sold principally for cooking, water heating in the homes, and to a small extent for lighting.

There is only one gas holder and it has a capacity of 85,000 cubic feet. The maximum production capacity of the plant is 100,000 cubic feet and the gas is distributed through approximately 1,723 feet of pipe.

The rate charged for gas in Barbados is $3 (12 shillings, 6 pence) for each 100 cubic feet of gas consumed. Various discounts also apply.

Bottled gas is not used in Barbados.

Electricity

The power plant of the Barbados Electric Supply Corporation, Limited, located at the Garrison about 2 miles from Bridgetown, has supplied electricity throughout the Island since 1911.

The equipment of the generating plant consists of 6 direct-coupled Mirrlees Diesel engine units as follows: 1 of 110 kw., 2 of 310 kw., 1 of 485 kw., and 2 of 340 kw. The present capacity of the plant is 2,370 kv.-a. (1,896 kw.)

The current supplied to households in Barbados is 3 phase, 50 cycles, alternating current, 110 volts, while electric energy for power is supplied at 3 phase with 200 volts between phases.

Consumption of electricity.—The industrial and domestic consumers of electricity totaled 3,676 at the end of 1936, and showed an increase of 1,840, or a total of 5,516 consumers at the end of June 1945.

There has been a steady increase in the amount of electric current sold in recent years, as is shown by the following figures:

Period	*Kilowatt-hours*
July 1939 to June 1940	3,491,601
" 1940 " " 1941	3,743,107
" 1941 " " 1942	3,943,711
" 1942 " " 1943	3,973,328
" 1943 " " 1944	4,032,301

The total amount of electricity sold in Barbados during 1936 was 2,625,485 kilowatt-hours.

Electric rates.—Various rates are charged for electric energy in Barbados, but the most general rate for lighting is 22 cents (Barbados currency) per kilowatt-hour with a minimum charge of $1. Domestic heating and power charges are 5 cents per kilowatt-hour and the rates charged for industrial power ranges from 5 to 8 cents per kilowatt-hour depending upon the amount of current used. The "All Purposes Domestic Supply Fixed Rate of 5 Cents per Kilowatt-hour" is usually chosen by householders. In addition to the regular electric bills, a war surtax of 13 percent is added to all bills.

Bermuda Islands

The Bermuda Islands are not included in the British West Indies. They consist of an irregular group of about 360 islands lying approximately 668 nautical miles southeast of New York City, and covering an area of 20 square miles, or about 12,800 acres, of which 1,135 acres are under cultivation. The Islands are of coral limestone formation and there are no minerals of any kind upon them.

Only 18 or 20 of the Islands are inhabited, and only 5 of them are of any importance, namely—Bermuda, Somerset, Ireland, St. George's, and St. David. Rainwater furnishes the only source of water supply, as there are no lakes, streams, or ponds on the Islands. Vegetation is green throughout the year, and frost is unknown.

The climate of Bermuda is delightful, with a constant breeze. There is always considerable moisture in the air, as the annual relative humidity is 82 percent. During the winter months, the temperature ranges from 50 to 70 degrees, and from 70 to 85 degrees during the balance of the year.

The currency is English; however, United States currency is readily accepted in commercial transactions. The English language is used throughout the Islands.

No recent census has been taken in Bermuda, but in 1944 the population was estimated to be over 30,000 of which 17,000 were colored.

The chief industry of Bermuda is the tourist trade, most of which comes from the United States. The style of living in the Islands is that of a resort. Exports consist of flowers and vegetables, while the only factories are a bottling works, ice plant, and the electric light plant and power company. Practically everything used in the Islands, including food and clothing, must be imported.

Hamilton, the capital and principal town of Bermuda, had an estimated population of 7,000 persons in 1944, excluding wartime military personnel. It is also the principal commercial center as well as the chief port for freight and passenger traffic.

Digitized by Google

Fuels and Power

Coal

Bermuda has no known coal resources. All such fuel must be imported, and the United States is the principal supplier.

Gas

There is no natural gas in Bermuda and no production of manufactured gas. Liquified petroleum is imported in 100-pound steel cylinders from the United States and it is sold to the consumer at £4-1-6. Distribution for the entire Colony is made from Hamilton.

This type of gas is used by 704 consumers for cooking and by a limited number for heating. There are only a few commercial users because of the lack of industrialization on the Islands.

Electricity

The Bermuda Electric Light, Power and Traction Company, Limited, was established in 1894 to supply services as indicated by its title. Practically all stock in the company is held in Bermuda or by Bermudans. It is the only plant supplying such services in the islands.

Alternating current, 1 and 3 phase, 60 cycles, 110 and 220 volts is supplied to consumers for lighting and power, respectively. Current is generated at 2,300 and 13,800 volts. Both overhead and underground cable are used.

The present equipment of the power plant consists of 7 Diesel oil engine sets, listed as follows: 5 Cammellaird Fullager Diesel engines direct connected to English Electric alternators—one each of 2,500 kv.-a., 2,000 kv-a., 1,250 kv.-a., and 2 of 937½ kv.-a.; one Willians-Diesel, direct connected to a Compton alternator of 140 kv.-a.; and one Vickers-Petters semi-Diesel direct connected to a 375 kv.-a. Brush alternator.

All equipment is of British manufacture and the total capacity of the plant is 8,140 kv.-a.

Consumption of electricity.—Most of the meters are installed in private homes, as very little power is used for commercial or industrial purposes. Electricity is used for lighting throughout Bermuda, including the rural areas. Other uses include cooking, heating, and refrigeration. All streets in Hamilton and St. George's and practically all country roads are lighted by electricity.

The use of electricity in the Bermudas is governed only by the regulations of the insurance companies operating in the Colony. These regulations conform to the National Electric Code of Fire Underwriters of the United States.

The annual increase in the amount of electricity consumed has been attributable not only to occasional reductions in rates, but also to the general prosperity of the Colony as a tourist resort, and the extended use of electrical appliances. There were 11,180 customers for electric energy in 1936, 13,000 at the end of 1937, and 14,500 at the end of 1939.

In 1937, 11,217,216 kilowatt-hours of electricity were produced of which 10,000,000 kilowatt-hours were sold. Gross sales of electricity from January 1 to December 31, 1939, amounted to 11,393,781 kilowatt-hours, while the total output for the year reached 14,206,643 kilowatt-hours. The unsold current was used by the company. (Later statistics are not available at this time).

Electric rates.—The monthly rates charged for electric current in the Bermudas, which became effective on November 1, 1938, are as follows:

1. HEATING ONLY. No lights or motors allowed on these circuits at all. 2.5d. per kw.-hr. for first 25 kw.-hr. 1.25d. per kw.-hr. for next 275 kw.-hr. 1.2d. per kw.-hr. for remainder. Discount of 10% if paid within 15 days after date of bill. Minimum charge of 1/6 per kw. of maximum demand but not less than 5/-.

2. SMALL MOTORS, aggregating less than 5 hp., with or without heating. No lights allowed on these circuits at all. 5.0d. per kw.-hr. for first 50 kw.-hr. 4.5d. per kw.-hr. for next 50 kw.-hr. 3.5d. per kw.-hr. for remainder. Discount of 10% if paid within 15 days after date of bill. Minimum charge of 2/6 per kw. of maximum demand but not less than 5/-.

3. MOTORS ONLY, aggregating 5 hp. and over. No lights or heating allowed on these circuits at all. 4.0d. per kw.-hr. up to 30 times hp. installed. 3.5d. per kw.-hr. for next 20 times hp. installed. 2.5d. per kw.-hr. for next 20 times hp. installed. 2.2d. per kw.-hr. for remainder. Discount of 10% if paid within 15 days after date of bill. Minimum charge of 2/6 per hp. installed but not less than 5/-.

4. LIGHTING. -/8d. per kw.-hr. for first 30 kw.-hr. -/7d. per kw.-hr. for next 170 kw.-hr. -/6d. per kw.-hr. for next 500 kw.-hr. -/5d. per kw-hr. for next 1,300 kw.-hr. -/4d. per kw.-hr. for next 7,000 kw.-hr. -/3d. per kw.-hr. for remainder. Discount of 10% if paid within 15 days after date of bill. Minimum charge of 2/6 per kw. of maximum demand but not less than 5/-.

5. Discounting or grouping cannot reduce bill below the minimum charge applicable to each meter.

6. Any customer using 100,000 kw.-hr. per year (1st July to 30th June) on the same or contiguous properties and whose consumption of current for lights does not exceed one-half of the total kw.-hr. used for all purposes, shall be entitled to a refund of whatever sum is necessary to reduce the average rate for the year to four pence (4d.) per kilowatt hour.

7. Any customer using 200,000 kw.-hr. per year (1st July to 30th June) on the same or contiguous properties and whose consumption of current for lights does not exceed one-half of the total kw.-hr. used for all purposes, shall be entitled to a refund of whatever sum is necessary to reduce the average rate for the year to three pence half penny (-3½d.) per kilowatt hour.

8. Any customer using 250,000 kw.-hr. per year (1st July to 30th June) on the same or contiguous properties and whose consumption of current for lights does not exceed one-half of the total kw.-hr. used for all purposes, shall be entitled to a refund of whatever sum is necessary to reduce the average rate for the year to three pence (-/3d.) per kilowatt hour.

Jamaica

Jamaica, the largest of the islands comprising the British West Indies group, has an area of 4,470 square miles and according to the 1943 census, has a population of 1,237,391. The capital city, Kingston, and its twin city, St. Andrew, have a combined population of 200,000 (1945) exclusive of rural areas within parish limits. The Cayman Islands, Turks and Caicos Islands, Pedro and Morant Cays are dependencies of Jamaica.

Jamaica, which lies south of the eastern extremity of Cuba, is very mountainous, with some of the peaks extending to heights of 7,402, 6,100, 5,056, and 2,300 feet, leaving only 413,440 acres of level ground.

There are numerous rivers and streams in the Island, but most of them are not navigable because of their rapid fall. The largest rivers are the Black River in the southwest and the Rio Grande in the northeastern part of the Island. The development of Jamaica's water power resources is discussed later.

The climate of the Island is tropical and the temperature fluctuates from 80 to 90 degrees Fahrenheit at sea level and from 45 to 75 degrees Fahrenheit in the mountains. The average annual rainfall is 76.46 inches.

Jamaica is primarily an agricultural country and the cultivation of bananas provides half of the income of the Island. Other important products are sugar, rum, beer, cigars and cigarettes, copra, essential oils, and wood extract.

Fuels and Power

Jamaica lacks coal and petroleum resources, although small deposits of an inferior quality of lignite have been found on the Island.

Gas[1]

The only public utility gas plant in Jamaica, known as The Gas Works, is municipally owned and serves the city of Kingston and a small portion of the city of St. Andrew.

[1] Based in part on a report from Vice Consul F. J. Royt, Kingston.

Digitized by Google

The three gas storage holders of the system are all located at the plant. The largest holder has a capacity of 120,000 cubic feet; the other two each have a capacity of 60,000 cubic feet. The 60 miles of gas mains which supply an area approximately 20 miles square, consist of the following sizes: 1 mile of 9-inch mains; 3 miles of 8-inch mains; 4 miles of 6-inch mains; 18 miles of 4-inch mains; 24 miles of 3-inch mains; 10 miles of 2-inch mains. House service connections consist of ¾-inch galvanized pipe with standard gas thread.

The annual imported fuel requirements of the gas plant average about 5,000 tons of gas-coal and about 28,000 gallons of gas-oil.

The Gas Works serves 1,209 customers, of which 200 are industrial users and the remainder are domestic. The plant also supplies gas for the operation of 665 street lamps. The gas street lamps, however, are gradually being replaced with electric lamps. There are 1,300 gas meters in use, of which the cast-iron dry meters of United States manufacture have proved the most popular.

The maximum daily capacity of the gas plant is 280,000 cubic feet and, as previously stated, the total capacity of the three gas holders is 240,000 cubic feet. The declared B.t.u. content of the gas is 450 per cubic foot. The gas consists of 80 percent normal coal gas mixed with 20 percent water gas. A small amount of fuel oil is used in the production of the water gas. The maximum pressure at the point of consumption is 2 inches (water pressure).

The gas plant is too small to engage in the manufacture of many by-products of gas production. Coke and tar are its only by-products.

Bottled gas is not used in Jamaica.

Rates to industrial and domestic gas customers are the same. The schedule is as follows:

Cubic feet	*Shillings for each 1,000 cubic feet consumed per month*
Up to 5,000	14/-
Up to 10,000	13/6
Up to 25,000	13/-
Over 25,000	12/6

The above rates, which went into effect on November 1, 1944, represent a 100-percent increase for the average domestic consumer, as the former rate for the first 5,000 cubic feet of gas was 7/- per 1,000 cubic feet. The municipality is considering operating the plant with fuel oil instead of coal with a view to reducing the operating costs which have advanced with the increased price of coal. The present gas rate, however, is slightly lower than the domestic electric rate on a heating basis.

[1] Based on a report by F. J. Royt, Vice Consul at Jamaica.

Electricity[1]

The lack of domestic fuels and the substantial hydraulic power resources of Jamaica tend to increase the demand for electric power. Most of the electric energy consumed in Jamaica, including that required for the operation of trolley buses and streetcars, is furnished by the power plants of the Jamaica Public Service Company, Limited (Canadian-owned, but under the management of a United States company). The plans of this company to extend its facilities throughout the Island by the consolidation of all existing power plants by a network of transmission lines is receiving governmental encouragement and assistance.

Prior to the program of consolidation, the power plants of the Jamaica Public Service Company, Limited, supplied power to Kingston, St. Andrew, and vicinity, as well as Montego Bay and Port Antonio (the latter through its subsidiary company, St. James Utility Company, Limited).

The new 5,240 hp. hydroelectric plant of the Jamaica Public Service Company, Limited, at White River, which was opened in June 1945, is connected by transmission line to Kingston. This year the company also acquired the privately owned power plants at Lucea, Falmouth, St. Ann's Bay, Black River, and Brown's Town.

With the exception of the generating stations operated by the Jamaica Public Service Company, all other generating systems in the Island operate on 60 cycles. Those of the company, which serve the most important areas of the Island, operate on 40 cycles.

The conversion of the newly acquired power plants to 40 cycles is now a controversial issue. The principal argument used in favor of the conversion from 60 cycles to 40 cycles is the fact that the Jamaica Public Service Company, as previously stated, serves the principal areas of the Island which have a combined population of approximately 200,000; while all of the other communities of the Island each have approximately 12,500 inhabitants or less. No proposal for an all-island franchise to the Jamaica Public Service Company is at present before the Executive or Legislative powers.

All electric current in the Island for residential consumption continues to be 110 volts, alternating current.

The only public utility electric power systems in Jamaica, other than the plants now owned by the Jamaica Public Service Company, Limited, or its subsidiaries are the following:

Ocho Rios and Oracabessa, hydroelectric, 100 hp. connected by transmission line. Owners: Prospect (St. Mary) Ltd.

Port Maria, Diesel operated. Owner: E. Prendergrast.

Mandeville, Diesel operated. Owners: Electric Service Co., Ltd., and under the same management as the St. Thomas Ice and Power Co.

Morant Bay. Owners: St. Thomas Ice and Power Co.

Savanna-la-Mar is the only municipal or Government-owned public service electric plant in Jamaica.

All of the generating plants in Jamaica are Diesel-powered with the exception of the following:

Plant	*Horsepower*
White River hydroelectric	5,240
Rio Cobre hydroelectric	1,350
Prospect, (St. Mary) Ltd., hydroelectric	100
Kingston steam	12,800

The combined capacity of all the Diesel-powered plants is approximately 2,000 hp.

Plans are under way for the erection of a hydroelectric plant of 7,500 hp. on Roaring River, and a 10-mile transmission line is now under construction from that point to White River. Any further extensive development of hydroelectric power in Jamaica has not been announced.

It is estimated that approximately 90 percent of the total amount of electric energy generated for use in Jamaica is supplied by the centrals of the Jamaica Public Service Company, Limited, and during 1938 that company generated a total of 17,932,145 kilowatts, of which 14,655,971 kilowatt-hours were consumed. The production of that company in 1944 was approximately 33,500,000 kilowatt-hours, of which 5,700,000 kilowatt-hours were generated by the Bog Walk hydroelectric plant on the Rio Cobre.

Electric rates.—On July 1, 1945, electric power rates for the residential consumers served by the Kingston network were reduced. The following tabulation shows the old rates and the rates which are now in effect:

Old rate	*New rate*
First 5 kw.-hr. for 5/- ($1.00) min. charge	First 10 kw.-hr. for 5/- ($1.00) min. charge
Next 25 kw.-hr. for 5d ($0.083) per kw.-hr.	Next 20 kw.-hr. for 5d ($0.083) per kw.-hr.
Next 100 kw.-hr. for 2.5d per kw.-hr.	Next 70 kw.-hr. for 2.5d per kw.-hr.
Next 170 kw.-hr. for 1.5d per kw.-hr.	Next 200 kw.-hr. for 1.5d per kw.-hr.
All over 300 kw.-hr. at 1d per kw.-hr.	All over 300 kw.-hr. at 1d per kw.-hr.

It will be observed that the new rate is especially favorable to the very small consumer.

Electric current characteristics.—Table 3 indicates the prevailing electric current characteristics in the various cities of Jamaica, and the time when electric service is furnished.

Digitized by Google

TABLE 3.—*Electric Current Characteristics*

Location	Kilovolt-ampere capacity	Type	Phase	Cycle	Voltage	Power	Time of service
Black River	20	AC	3	60	110/220/440	Diesel	Night
Falmouth	30	AC	3	60	110/440 2300	do	do.
Kingston (St. Andrew and St. Catherine)	9,630	AC	3	40	110/220/127 2300	Hydro and steam	Day and night
Lucea	30	AC	3	60	110/220/440	Diesel	Night
Mandeville	.....	AC	3	60	110/220/440 2300	do	Day and night
May Pen	45	AC	3	60	110/220/440	do	Night
Montego Bay	650	AC	3	60	110/220 2300	do	Day and night
Morant Bay	.....	AC	3	60	110/220	do	Night
Port Antonio	185	AC	3	60	110/220	do	Day and night
St. Ann's Bay	67	AC	3	60	110/220/440/880 2300	do	Night
Savanna-la-Mar	.....	AC	1	60	110/220 2300	do	Day and night

Leeward Islands

The Leeward Islands, which form the northeast corner of the West Indies, cover an area of 422 square miles, and had a combined population of 101,146 in 1944. These islands are composed of four Federated Presidencies, namely: Antigua and Barbuda; St. Kitts-Nevis-Anguilla; Montserrat, and the Virgin Islands.

Antigua

The Island of Antigua has a population of 42,789. The capital city, St. John's, also the seat of government for the Leeward Islands, is the largest city in the Islands. Antigua is low and the soil is fertile. Sugar is the Island's principal crop. Barbuda, an island of coral formation, lies 40 miles to the north of Antigua.

Electric energy of 220 volts, direct current is furnished on Antigua by the Diesel-operated power plant of the Antigua Electric Light Company, Limited. The voltage regulation one-half mile from the station is approximately 6 percent. The local sugar factories operate their own generating stations. As elsewhere in the British West Indies, rates charged for electricity in Antigua are high.

St. Kitts-Nevis-Anguilla

St. Kitts and Nevis are separated by a 2-mile strait. The central region of St. Kitts is quite mountainous, and this Island is the distributing center for merchandise destined for the neighboring British and Dutch islands. It has a population of 18,533 and covers an area of 68 square miles.

The area of Nevis is 50 square miles and that of Anguilla is 34 square miles. Their population is 14,597 and 5,175, respectively.

The Electricity Commissioner of St. Kitts-Nevis reports that 230 volts direct current is supplied. The three-wire system is employed. The capacity of the generating plant is 140 kilowatts.

The power supplied by the St. Kitts Sugar Factory power plant for its own use is 440 volts, alternating current, 60 cycles, 3 phase; while 110 volts, 3 phase current is generated for the use of the factory premises. The capacity of this power plant is 250 kilowatts.

Montserrat

The estimated population of Montserrat is 13,332. The Island covers an area of over 32 square miles about half of which (10,000 acres) is comprised of arable land. It is of volcanic formation and very rugged and mountainous. The principal crops are cotton, fruit, and vegetables. Plymouth is the capital city.

Apart from the 1.5-kilowatt generator at the Government Cold Storage plant, a few small gasoline-driven domestic lighting sets and some windchargers, there are no electric current generators in Montserrat.

British Virgin Islands

The British Virgin Islands which lie about 100 miles northwest from St. Kitts and 60 miles eastward from Puerto Rico, form a connecting link between the Greater and Lesser Antilles. Tortola, the largest and most important island, covers an area of approximately 21 square miles, and has an estimated population of 6,720. The capital city of Tortola is Road Town. Grants previously made by the Colonial Development Fund are now being applied to the development of peasant agriculture and the raising of livestock on the islands for export purposes.

There are only one or two privately owned small gasoline-driven domestic lighting sets in operation on the Island of Tortola.

Trinidad and Tobago

Trinidad, with an area of 1,864 square miles and an estimated population on December 31, 1942, of 506,316 is the most southerly of the British West Indies. Its flora and fauna, as well as its geological structure, are similar to those of the nearby South American Continent. Port of Spain is the capital city.

Tobago is separated from Trinidad by a 27-mile wide channel, but the two islands are grouped together for administrative purposes. The population of Tobago was estimated to be 25,358 on December 31, 1941. It covers an area of 116 square miles, and Scarborough (formerly called Port Louis) is the Island's principal city.

The white population of the two islands is composed of English, French, Spanish, and Portuguese; while the remainder of the inhabitants are people of African descent, British Indians, and Chinese.

The climate of Trinidad is warm and humid, but the nights are cool. Tobago is cooler and less humid than Trinidad.

Fuels and Power

Oil is an important factor in the economic life of Trinidad as that Island is the largest producer of crude oil in the British Empire.

Another natural resource of Trinidad is the world famous Asphalt Lake, known as "Pitch Lake," which covers about 114 acres. It is owned by the Colony, but has been leased to an operating company for a number of years.

Considerable firewood is cut annually from the 867 square miles of Crown-owned forests. Much of this fuel is consumed by the local charcoal burners and industrial undertakings.

The coal-bearing Tertiary beds, found in the eastern part of the Island of Trinidad, have not proved of commercial importance.

There are no developed facilities for the use of natural or artificial gas, nor have the water power resources been developed for hydroelectric power.

Electricity

Trinidad's electric supply is generated at a steam plant of 2,400 kilowatt capacity, located in Port of Spain, and a smaller Diesel-operated plant at San Fernando, the second largest commercial center of the Island. Both plants are municipally owned and are operated by the Trinidad Electricity Board as trustees.

The current supplied for domestic light and power is 115/230 volts, 60 cycles, alternating current, while that supplied for power is 230 volts, 60 cycles, 3 phase.

There is also a privately owned generating plant at Pointe-a-Pierre, which is operated for the benefit of a local oil company and its employees.

Electric rates in Port of Spain.—The electricity rates for Port of Spain were reduced by the Trinidad Electricity Board on January 1, 1939. Large domestic consumers of electricity benefit slightly by the new rates, while the reduction to moderate consumers is not sufficient to encourage additional purchases of small electrical appliances, and the rate still remains prohibitive to the use of large-sized electric cookers.

The following is a summarization of the rates now in effect:

Domestic Light and Power Rate —Optional

Standing Charge—A floor area charge of 50 cents per 1,000 square feet with a minimum of 50 cents per month, and

Digitized by Google

steps of 500 square feet, except that any excess area over 4,000 square feet will be charged at 30 cents per 1,000 square feet, with an additional charge of $1 per month per kilowatt for any apparatus of one kilowatt capacity or over.

Energy Charges—For the first 20 kilowatt-hours, 15 cents per kilowatt-hour; next 20 kilowatt-hours, 10 cents each; next 40 kilowatt-hours, 5 cents each; additional kilowatt-hours, 3 cents each.

Minimum Bill—Standing charge.

Domestic Light and Power—Standard

Energy Charge—20 cents per kilowatt-hour; minimum charge, 80 cents per month.

Application New Rates

Special attention is directed to the standing charge, which (in addition to the minimum charge of 50 cents per month) includes a charge of $1 per month per kilowatt for any apparatus of 1 kilowatt capacity or over. This is interpreted by the Electricity Board to mean the maximum capacity of any such apparatus. For example, an electric stove having a maximum capacity of 7,000 watts would be subject to a standing charge of $7 per month over and above the cost of the electric current consumed.

Local electric dealers were advised by the Trinidad Electricity Board that all electrical appliances rated at 1,000 watts or over should be suitable for 230 volts. The voltage for smaller appliances is 110 volts, alternating current, 60 cycles, single phase. However, if more than one element is included in the appliance, it must be possible to connect them up to a 115/230 volt 3-wire supply.

Windward Islands

The Windward Islands are composed of Grenada, St. Lucia, St. Vincent, Dominica, and a group of smaller islands known as the Grenadines. Although they are grouped together for administrative purposes, the islands do not constitute a Federal Colony as each island retains its own institutions, tariff, or revenue; nor are there common laws applying to the islands. There is a West Indian Court of Appeal and the islands unite for other common purposes.

Geographically, Barbados, Trinidad, and Tobago belong to the Windward group, and were formerly associated with it politically.

Less than 5 percent of the population are whites, and the majority of the inhabitants are Negroes.

Grenada

The population of Grenada was estimated to be 87,805 in 1942. Its area is 120 square miles. The island is mountainous and picturesque, abounding with streams and mineral springs. Its chief exports are cocoa, nutmeg, mace, bananas, and limes. There are no industries.

St. George's is the principal city of Grenada and also the site of the Government-operated Diesel power plant. The electric current furnished by the plant is alternating current, 50/60 cycles, 230 volts.

The charge per kilowatt-hour for electricity for lighting purposes is on a graduated scale based on the amount of current consumed, and ranges from 1s to 6d for domestic power. For industrial power, the range is from 4d to 2d, while for a noninductive industrial load, the charges range from 6d to 1½d per kilowatt-hour.

A local ice factory operates a small hydroelectric plant for its own use. The water shortage in St. George's has resulted in the proposed erection of a 95,000-gallon water tank, with a public water line running from the well to the power station and another line running to the factory, according to the Windward Islands press. This proposal was made by the Grenada Public Health Engineering Unit, because, in the past, lime growers have met with heavy losses due to the forced closing of the ice-factory on account of the water shortage.

St. Lucia

St. Lucia is the largest of the Windward Islands and has an estimated population of over 75,000, of which only about 150 are white. Castries, the capital city, has a population of approximately 9,000. The town of Soufriere, 60 miles to the north of Castries, is the site of an ever-active volcano.

The total area of the Colony is 152,320 acres (238 square miles). Some fruits and vegetables are raised for export, but the major portion of the Island is unsuited to any form of permanent agriculture.

A dense forest formerly covered the Island of St. Lucia, but today hardly more than 20 square miles of it remains. Further deforestation is under strict control, while reafforestation on a limited scale in the important catchment areas of the interior is in progress. Considerable timber is exported for charcoal manufacture for the Barbados market.

The Diesel-operated power plant at Castries is municipally owned and the power generated is alternating current, 230 volts, 50 cycles, 3 phase. There are no transformers to step up the current. At Soufriere, a water wheel of 15 kilowatts capacity and a Diesel generator of 10 kilowatts capacity supply direct current at 230 volts.

St. Vincent and The Grenadines

Included in the 150-square mile area of St. Vincent are the 5 islands of the Lesser Grenadines lying about 100 miles west of Barbados. In 1942, the population was estimated to be nearly 60,500. Kingstown is the capital city of the Island. The climate is very healthful and the temperature ranges from 78 to 85 degress Fahrenheit. The Island is mountainous, of volcanic origin, and with very little flat land except in the valley bottoms and around the shores of the larger bays. Cotton, bananas, arrowroot, cassava, and sugar are the chief products of St. Vincent. Few industries operate on the Island.

Of the total of 27,000 acres of Crown land, approximately 15,000 acres are forest reserves, but there are few trees of economic value. The Crown lands lying above 1,000 feet are maintained as forest reserves for protective purposes and for conserving the water supply.

Some of the small islands lying to the north of Grenada and known as The Grenadines are dependencies of St. Vincent. The largest of this group is Carriacou. The others are Bequia, Moustiques, Mayreau, Cannouan, and Union Island.

St. Vincent's electricity works are Government-owned, and consist of a Diesel-operated plant of 160 kv.-a. capacity located at Kingstown. The generating equipment consists of 2 Rustons, each of 50 kv.-a., and one Belliss and Morcom of 60 kv.-a. capacity. The electricity supplied is alternating current, 3 phase, 50 cycles, 230/440 volts.

Dominica

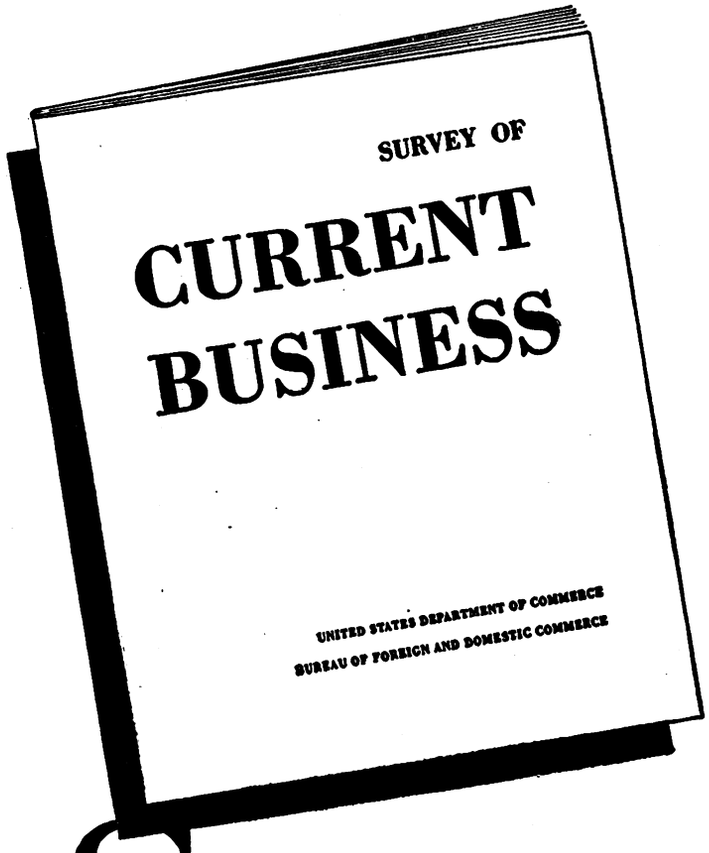
Dominica is the most ruggedly beautiful of all of the British West Indies. The Island is 304 square miles in area, and has an estimated population of 53,686. Tropical fruits are the chief product of the Island.

The annual rainfall in Dominica averages 300 inches in the interior.

The Government-owned hydroelectric power plant is located at the capital city, Roseau. Direct current is supplied at 220 and 440 volts.

★ U. S. GOVERNMENT PRINTING OFFICE: 1946—679532—118

Digitized by Google



$2.00 per year

SURVEY OF CURRENT BUSINESS

THIS AUTHORITATIVE MONTHLY PERIODICAL makes easily available to businessmen over 2,200 comprehensive facts about production, stocks, orders, prices, sales, shipments, etc., of the industries of the United States by means of text, tables, charts, and index numbers.

A sample copy will be sent, on request to the
Bureau of Foreign and Domestic Commerce,
Washington, D. C.

$2.00 per year, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Digitized by Google

Domestic Commerce

written for

BUSINESSMEN . .

● Here is an authoritative monthly periodical written in the language of the American businessman. It is one of the principal organs of the Department of Commerce for disseminating information deemed of importance in maintaining a vigorous and dynamic free enterprise system.

● Domestic Commerce gives the reader an understanding of the progress and changing conditions of industry and business of the United States. Its writers are officials of this and other Government agencies, and specialists in the various subjects covered.

● Particular attention is given to developments in the field of post-war planning.

A sample copy will be sent you upon request to the Bureau of Foreign and Domestic Commerce, Washington 25, D. C.

$1.00 per year . . . from the Superintendent of Documents

U. S. GOVERNMENT PRINTING OFFICE • WASHINGTON 25, D. C.

Digitized by Google

...uments Room

Industrial Reference Service

U. S. DEPARTMENT OF COMMERCE, HENRY A. WALLACE, *Secretary*
Bureau of Foreign and Domestic Commerce, AMOS E. TAYLOR, *Director*

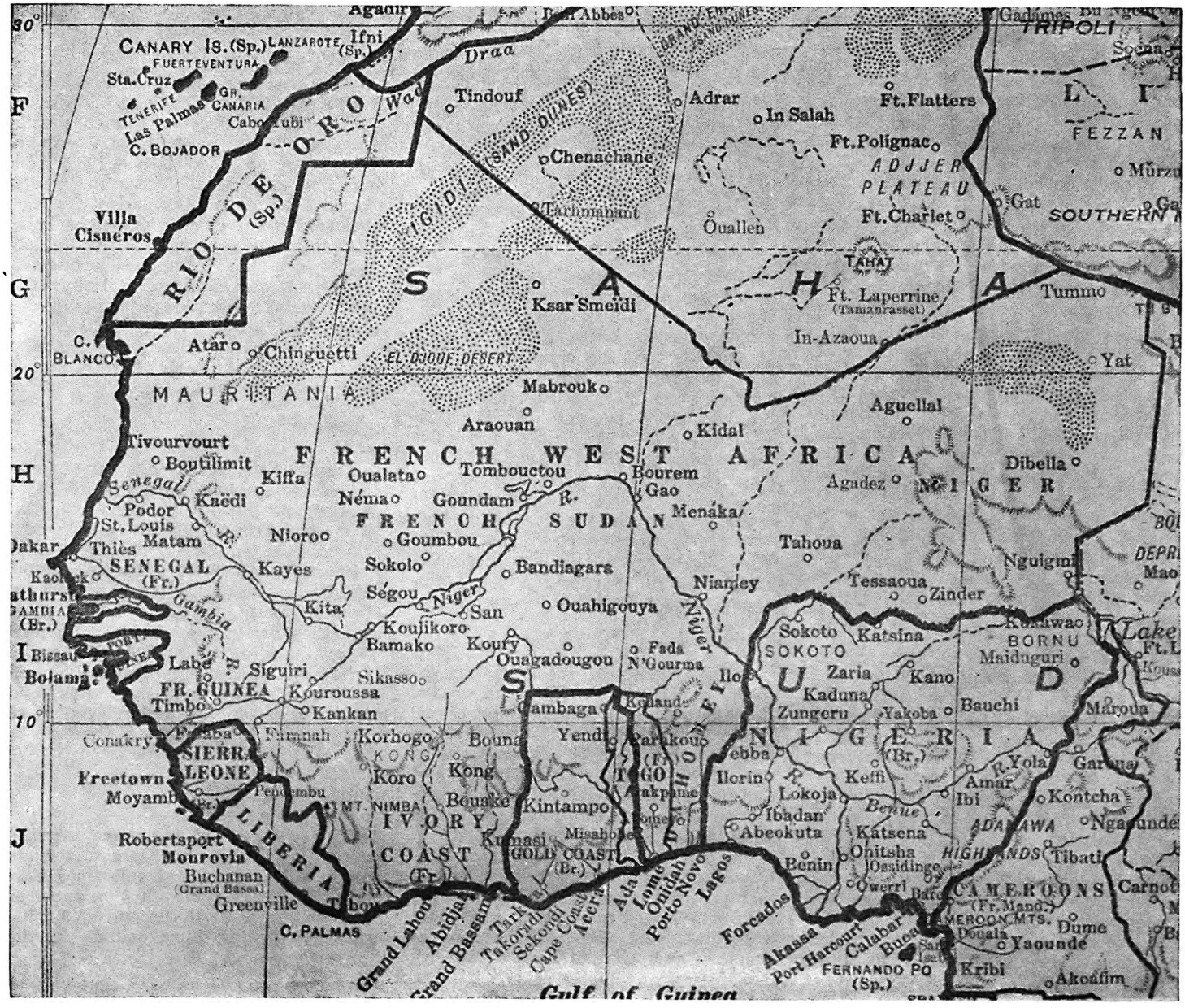
Part 1. TRANSPORTATION and PUBLIC UTILITIES

Available in Parts Covering Selected Services and Commodities
Annual Subscription $1.50. Price this report 5 cents
For sale by the Superintendent of Documents, Government Printing Office, Washington 25, D. C., or any of the Department's Field Offices

Volume 4—Part 1 | March 1946 | Number 5

Telecommunications in French West Africa

Prepared by Transportation Unit, James C. Nelson, Chief



Digitized by Google

D 42522

Telecommunications in French West Africa

Based on a report by Armistead M. Lee, Vice Consul, American Consulate General, Dakar

Arranged by Robert C. Smith

The Federation of French West Africa includes the colonies of Dahomey, French Guinea, French Niger, French Sudan, Ivory Coast, Mauritania, and Senegal. For the purpose of this report, however, the French Mandate of Togoland also is considered a part of French West Africa.

With Togoland included, the area of French West Africa is 1,835,789 square miles, and the population, constituted for the most part of the many native tribes, totals about 16 million. The standard of living of the white inhabitants, who number about 40,000, is much the same as that in France; that of the natives, generally low.

French West Africa extends from 4 to 27 degrees north latitude and from 17 degrees west to 16 degrees east longtitude. Consequently, the climate varies greatly from the dry heat of Mauritania to the oppressive humidity of the tropical forests of French Guinea and Ivory Coast. Dakar is pleasant and cool from December until June but is damp and hot during the rest of the year. In Sudan and Niger, on the other hand, the rainy season brings cooler weather.

The language of the European inhabitants is French, which the natives in urban areas also speak fairly well.

Telecommunication facilities in French West Africa are Government owned and operated and all civil communications are operated by the Service des Transmissions of the Government General. The land line telephone and telegraph systems suffer from lack of integration. While it is possible in normal times to send telegraph messages by land line from Dakar to any of the colonial capitals and larger towns, there is no long distance telephone network in any of the colonies except Senegal. A network of radio stations provides communication facilities to many interior points.

Public Telephone System

The telephone system in French West Africa as noted above, is operated by the Service des Transmissions of the Government General. Interurban telephone development is in an embryonic stage in Dakar and a few other centers in the colonies. Although the Service des Transmissions has elaborate plans for the development of telephone connection between all the colonial capitals, it is not expected that this project will be realized in the near future. The only telephone equipment on order is for maintenance of present facilities.

TABLE 1.—*Telephone System in French West Africa, January 1, 1944*

[Circuits and conductors in miles.]

Colony	Interurban circuits	Interurban conductors[1]	Length of urban conductors		Number of subscribers		Service phones
			Overhead	Underground	Principal	Branch lines	
Senegal	1,159	4,061	749	18	820	270	71
Mauritania	559	677	6		6		4
Sudan	2,512	3,705	254		432	283	33
Ivory Coast	1,466	1,891	534		536	362	43
Guinea	316	902	93		223	169	13
Dahomey	83	394	255		180	173	11
Niger	1,179	1,274	65		62	62	12
Togo	497	708	126		126	137	24
Circumscription of Dakar	66	836	40	68	1,249	1,531	64
Total	7,837	14,448	2,122	86	[2] 3,634	[3] 2,987	275

[1] Length of individual wires, as distinct from length of circuits.
[2] Increased to 3,747 as of December 1944.
[3] Increased to 3,084 as of December 1944

Service Area

French West Africa can never be regarded as a telephone service area since the whole of Mauritania and the greater part of the two vast colonies of the Sudan and the Niger are virtually uninhabited desert. Even the ambitious reorganization plan of the Service des Transmissions does not envisage serving these regions, or complementing by telephone line the present telegraphic connection between Niamey and Zinder in the Niger.

There is at present no telephone connection between any of the colonies, and most of the available long distance telephone service must depend on the use of such of the telegraph lines as lend themselves to alternate use for telephone communication. Where lines are used alternately, telegraph traffic has priority over telephone communication.

Equipment

Central telephone exchanges are located in Dakar, St. Louis, Bamako, Kaolack, Abidjan, Conakry, and Lomé. While the exchange at Dakar is equipped with a Thompson-Houston (French) automatic switchboard and dial phones, supplemented with a manual switchboard, all other exchanges have manual switchboards.

The capacity of the automatic switchboard at Dakar is 1,000 lines, and a manual switchboard supplements the automatic board to serve an additional 260 subscribers. The switchboards at Conakry and Abidjan have a capacity of 300 lines; those at St. Louis, Bamako, Kaolack, and Lomé, 150 and 200 lines.

All equipment is of French manufacture. While most of the switchboards are of Association des Ouvriers en Instruments de Precision manufacture, telephone instruments, all of the traditional French one-piece type, are of various makes. With the exception of the telephones connected to the automatic central at Dakar, the instruments are of the local battery or magneto type.

A statistical summary of the telephone system in each of the Colonies is shown in table 1.

Traffic

During 1944, the second year of service of the automatic dial system, there were 71,561 out-of-town calls from Dakar and 1,630,847 local calls, which represented an increase over 1943 of 44 percent and 49 percent, respectively. Traffic on the other city centrals in French West Africa, for which exact statistics are not available, remained about the same during 1944. The entire telephone system appears to be used to capacity at the present time, and unless new supplies arrive soon, there is expected to be a sharp decrease in the capacity of the system.

Rates

The charge for telephone service, either local or long distance, is made on a call basis. Local calls in Dakar are 1.20 francs for each 3 minutes or fraction thereof. At the end of 3 minutes a warning buzz sounds in the earphone.

Digitized by Google

Long distance day rates per 3-minute call within 25-, 50-, and 100-kilometer radii of the Dakar-Senegal network are 3, 4, and 6 francs, respectively, with a 2-franc additional charge for each 100 kilometers beyond the 100-kilometer radius. Long distance night rates, double the day rates, apply between 7 p.m. and 7.a.m.

Public Telegraph System

As previously noted, the telegraph system of French West Africa, like that of the telephone system, is operated by the Service des Transmissions of the Government General. The telegraph system is somewhat more extensive than the telephone system, and in normal times it is possible to send a message by land line from Dakar to any of the colonial capitals and the larger towns. However, the telegraph system is not up to present-day standards. The following translation from the report of the Chief of the Technical Section of the Service des Transmissions sums up the condition:

"There does not exist either the necessary fixtures for high-speed work, nor lines equipped for multiple transmission, nor repeaters, nor teletype machines, in short, nothing in the nature of modern equipment."

Equipment

There were 440 telegraph offices in French West Africa in December 1944. On this same date there were altogether about 30,000 kilometers (18,641 miles) of telegraph line, with somewhat more than 40,000 kilometers (24,855 miles) of wire.

The greater part of the system has only a single conductor, and messages are sent manually by Morse code. Although copper wire has been used when available, particularly for the parts used also for telephone, the greater part of the network is composed of 3-mm. galvanized iron wire.

The trunk lines, such as Dakar-Bamako, Dakar-St. Louis, Conakry-Kankan and Abidjan-Bobo Dioulasso, are double lined and supported on metal poles sunk in concrete bases. Other lines are strung from 3 to 6 feet above the ground on trees, bushes, or any other natural support to be found. Most of the telephone and telegraph lines within Dakar are carried in buried cable.

A statistical summary of the telegraph system in each of the colonies is shown in table 2.

TABLE 2.—*Telegraph System In French West Africa, January 1, 1944*

[Lines and conductors in miles.]

Colony	Length of lines	Lines on wood poles	Lines on metal poles	Length of conductors		Number of offices		
				Copper	Iron	Central offices	Branch offices	Railroad stations open to telegraph
Senegal [1]	1,731	114	1,617	358	2,881	2	48	17
Mauritania	684		684	112	572		9	
Sudan	4,528	2,620	1,908	649	6,136	1	49	40
Ivory Coast	4,390	3,913	477	612	5,871	1	47	34
Guinea	2,362	1,555	807	193	2,268	1	33	21
Dahomey	1,298	964	334	129	1,376		21	
Niger	1,926	775	1,151		1,989	1	12	
Togo	621	290	331	1,181		1	7	11
Total	17,540	10,231	7,309	3,234	21,093	7	226	123

[1] The figures for Senegal include the circumscription of Dakar.

Traffic

The telegraph system is used to capacity. Traffic statistics for telegrams sent by overland wire are not available since messages are sent either by wire or radio depending upon conditions, and separate statistics of traffic in each category are not reported.

More than 35 million words of paid telegrams, official and private, were handled during 1944 by wire and radio together. This number included 909,039 private telegrams with 15,220,000 words and 371,856 official telegrams with 20,039,000 words. The above totals do not include service messages or the daily news which is sent to all stations. Total telegraphic receipts by wire and radio in 1944 amounted to 18,408,988 francs.

Rates

The new tariff of telegraph rates, applicable to messages sent either by land line or radio, was established by the Governor General's *Arrete* No. 883 D.T., of March 20, 1945. A uniform rate applies to all telegrams, regardless of distance, from one point to another in French West Africa and Togo. The rates are established in Article 4 of the resolution cited above as follows:

Nature of message (or of service)	Tariff
I. Ordinary private telegrams and official telegrams whether sent by wire or radio	1.20 francs per word. Minimum charge—12 francs. 0.6 franc per word.
II. Press telegrams	6 francs minimum.
III. Additional telegraphic charges.	
1. Phoned telegrams	
a) In clear, French language.	
At departure:	
By 50 words or fractions of 50	2.40 francs.
On arrival:	
For first 50 words	Gratis.
For additional 50 words or fraction thereof	1.20 francs.
b) In foreign language or code	
At departure:	
For 50 words or fraction thereof	5 francs.
At arrival:	
For 50 words or fraction thereof	3 francs.
c) Delivery of confirmation copy	
By post	Gratis.
By telegram	3 francs.
2. Multiple telegrams	
For each copy and by indivisible fraction of 50 words	8 francs.
3. For furnishing at the counter a coupon for prepaid telegraphic reply to be sent by mail	3 francs.
4. Cancellation of a telegram before transmission	4 francs.
5. Telegram for delivery to proper hands [1]	2 francs.
6. Telegram with receipt	2 francs.
7. Copies of telegrams, by copy:	
Up to 50 words	5 francs.
Beyond 50 words, by indivisible fractions of 50 words after first 50	3 francs.
8. Delivery of original of telegram at counter	5 francs.
9. Receipt for deposit	
At time of deposit	1 franc.
Subsequently, within 6 following months	40 francs.
10. Registered addresses: 1 year	240 francs.
6 months	150 francs.
1 month	40 francs.

[1] When specified that it must be personally delivered into the hands of addressee only.

Radio Telegraph and Telephone

Radio is an important medium for the transmission of telegraph and telephone messages in French West Africa in both the domestic and international service. In many instances, radio provides the only communications link between various towns in the several colonies.

Five separate official French organizations are engaged in radio transmission in French West Africa. These organizations are the Direction des Transmissions of the Government General, the Army, the French Air Force,

Digitized by Google

the French Navy, and the Aircraft Protection Service (Service des Telecommunications et Signalisations). The latter is a semimilitary service directly responsible to the Air Ministry at Paris.

The Direction des Transmissions operates the two stations of the Intercolonial Network at Dakar and Bamako and the Federal Network has some 58 stations (not all operating), located throughout the interior. The location, call letters, power, and frequency of these stations are shown in the appendix to this report.

The Army, in addition to operating a 2-kilowatt transmitter at Dakar and a network of small 200-watt stations in the interior, operates the civil stations of the Federal Network at Atar, Nema, Tombouctou, Gao, Agades, and Zinder.

The French Air Force has a 500-watt transmitter at Dakar in contact with Paris, Algiers, Brazzaville, and other points in the "Imperial Network." The Air Force also has a 500-watt station at Atar (Mauritania) and 120-watt transmitters at Dakar, Oukam, Thies, Bamako, and Gao.

The French Navy operates one station located at the Naval headquarters in Dakar and another, the principal station, at the nearby suburb of Hann. Point-to-point contact is kept with Freetown, Pointe Noire, Fort de France, and Paris. Ship-shore communication previously handled by the Service des Transmissions has been conducted during wartime by the Navy.

The operations of the aircraft protection service are described in this report under the subject of aircraft navigational aids.

International Contacts

Point-to-point contact with stations outside of French West Africa is maintained by the Dakar and Bamako stations of the Intercolonial Network of the civil government. Stations of the Army, Navy, and Air Force, as noted above, also maintain international contact for military messages.

The present schedule of point-to-point contacts maintained by the civil station at Dakar is shown in table 3. It should be noted that radio schedules are subject to frequent changes and additions.

The station at Bamako uses an 8-kilowatt transmitter which is in scheduled contact with Paris, Algiers, Beirut, Brazzaville, Douala, and Djibouti. The station transmits variously on 15,377 kilocycles (call letters FZM) and 9,740 kilocycles (call letters FZM2).

Rates

The rates listed under wire telegraph apply also to messages sent by radio within French West Africa. Telegrams sent abroad are considerably more expensive. The following schedule shows the charges for private radiograms to New York in French West African francs.

Item	Rate per word in francs
Full tariff	24
L. C. (deferred)	12
N. L. T. (deferred to 48 hours, minimum 25 words)	8
Code messages	14.40

There is a single rate of 12 francs for official radiograms to the United States in clear language and 7.20 francs for official messages in code. Official radiograms receive precedence over the other classes of service including full-tariff private messages. As rates for radiograms are approximately half those for cablegrams and cablegrams have to be relayed via Freetown and Great Britain with consequent delays, radio is used almost exclusively for messages to the United States.

TABLE 3.—*International Schedule of Dakar Radio Station*

Call letters	Power in kilowatts	Frequency	Correspondent	Hours (G.M.T.)
FZK	2	11,475	Rabat	0800 to 0900
FZK2	2	15,470	Beirut	0800 to 0900
FZK2	2	15,470	Fort de France (Martinique)	1130 to 1300 1400 to 1600
FZK3	15	15,840	Noumea (New Caledonia)	0700 to 1000 (or FZK5)
FZK3	15	15,840	Paris	1000 to 1900
FZK5	15	8,108	Noumea	0700 to 1000 (or FZK3)
FZK5	15	8,108	Paris	1900 to 2230
FHE2	15	11,712	New York	1300 to 1400
FHE	15	15,392	Brazzaville	1415 to 1600
FHE	15	15,392	Beirut	1600 to 1700
FHE	15	15,392	Papeete	1630 to 1815

Submarine Cables

All French cables, whether owned by the State or nominally owned by the Compagnie des Cables Sud-Americains (Dakar-Pernambuco, Conakry-Monrovia-Grand Bassam) are administered under the Service des Cables Sous-Marins Francais de l'Ouest Africain, which is directly responsible to the Ministry of Communications in Paris.

The sections of both the coastal and transatlantic cables, with the age and length of each section, are shown in table 4. All of the ruptures indicated in this table were due to natural causes, and plans have been made to repair the coastal cables pending arrival of cable ships. Final decisions have not been made on the repair of the Dakar-Brest and the Dakar-Pernambuco cables.

The Dakar-Brest cable and the Dakar-Casablanca cable are both equipped for duplex operation. These and the British cable from Conakry to Freetown are also equipped for automatic transmission. Creed (British) recorders, which first perforate signals on a ribbon of paper tape, then run the tape through the transmitter at high speed, are used. The line to Casablanca may also be operated with a Baudot-Picard teletype. As indicated above, the cable to Brest is not now in operation because of a rupture which occurred on April 25, 1941.

TABLE 4.—*Length and Age of Submarine Cables in French West Africa*

Cable section	Year of laying	Length (Nautical miles)
Dakar-Brest [1]	1905	2,423
Casablanca-Dakar	1916	1,598
Dakar-Conakry	1932	631
Conakry-Monrovia [2]	1912	309
Monrovia-Grand Bassam [3]	1912	500
Grand Bassam-Cotonou	1935	546
Cotonou-Lome	1921	82
Cotonou-Libreville	1912	652
Cotonou-Douala [4]		
Transatlantic cables		
Dakar-Fernando Noronha [5]	1907	1,620
Fernando Noronha-Pernambuco (Brazil) [6]	1892	347
British cables		
Conakry-Freetown	1886	71
Lagos-Cotonou [7]	1902	66

[1] Cut on April 25, 1941.
[2] Cut on February 24, 1945.
[3] Cut on December 27, 1944.
[4] Data not available.
[5] Cut on September 1, 1941.
[6] Cut during 1940.
[7] Cut on April 16, 1945.

Traffic

Despite the ruptures in several important lines, the volume of cable traffic handled has been increasing during the war as follows:

Year	Number of words handled at Dakar
1938	1,603,512
1941	3,717,080
1942	4,164,864
1943	9,574,224
1944	over 10,000,000 (tabulation not complete)

Rates

Cable rates are independent of the general telegraph tariff of the Service des Transmissions and are considerably higher than the land line rates. It costs four times as much, for instance, to send a private message from Dakar to Conakry by cable as by telegraph. However, the cable service is so much faster that there is no lack of customers as indicated by the traffic statistics above.

There is a 50-percent reduction in rates for official cables, and a recent agreement with the British makes this reduction applicable to British official messages as well. No other reduced rate, such as that given in the telegraph and radio services of the Direction des Transmissions for night or deferred messages, applies.

Digitized by Google

The rate for cable messages to the United States is double that for radiograms. For this reason it is not likely that anyone would wish to send a message by cable to the United States, especially since a cablegram would have to be relayed via Freetown and Great Britain with consequent delays.

Radio Broadcasting

The Service des Transmissions operates the broadcast station of Radio-Dakar on a frequency of 7,210 kilocycles with antenna power of 12 kilowatts. Programs are broadcast simultaneously on smaller 200-watt transmitters on 8,890 and 3,433.5 kilocycles. The latter frequency is being used at present on a trial basis. When the 12-kilowatt transmitter at the Hann Station (suburb of Dakar) has been repaired, it is considered likely, though not certain, that broadcast programs of Radio-Dakar will be sent over this transmitter using the previously assigned frequency of 15,345 kilocycles. There are no other broadcast stations in French West Africa.

The schedule of programs broadcast over Radio-Dakar is as follows:

Hour (G.M.T.)	Program
0715-0740	News
1215-1230	News
1230-1300	Music
1845-1910	News
1910-2115	Continuous broadcast of variety programs, music, plays, talks.
2115-2130	News

Transmission ends at 2130 except on Thursdays when there is a musical program until 2200 hours.

The news and entertainment programs are under the management of the Director of Information Services of the Government General. Local artists and recorded music are used on the programs. There is no commercial advertising, so the broadcast expenses come under the budgets of the Service des Informations and the Service des Transmissions. The latter agency licenses radio receiving sets, but the fees go into the general budget of the Government General and are not handled in any separate account for the support of Radio-Dakar.

A total of 1,254 private radio receivers are now reported in Dakar. Full reports have not yet been received on the number of radio receivers throughout the federation.

Reports of good reception of Radio-Dakar have come from Australia, New Caledonia, Sweden, Canada and the United States.

Amateur Radio

Amateur radio transmissions are not permitted at present in French West Africa.

Navagation Aids

Aircraft Aids

The civil stations of the Federal Network operated by the Service des Transmissions engage in aircraft protection on demand. While most of the towns equipped with radio stations have adjoining landing fields, the only fields of sufficient size and quality to handle modern transport planes are those located at Dakar (Ouakam and Mallard Fields), Rufisque (Eknes Field), Thies, St. Louis, Bamako, Kankan, Abidjan, Conakry, Cotonou, Gao, Niámey, and Zinder.

The direction and control of aircraft radio communication is under the Service de Telecommunications et Signalisations, which is responsible directly to the Air Ministry in Paris. At present only two stations are operated directly by the Aircraft Protection Service. These stations are the former Air France stations FSN at Ouakam Field (Dakar) and FSR at Gao (Sudan), terminus of the trans-Saharan air route.

The Dakar station FSN is adjacent to the Ouakam airport. The station has six transmitters of United States manufacture. A long-wave transmitter of 2-kilowatt power transmits to planes in flight on 860, 893, 900 and 1,100 meters. The control equipment is of French manufacture. The station is open continuously for aircraft protection. No details are given of the equipment in use at Gao.

There is a day and night goniometer (direction finder) at Ouakam Field. Daytime goniometers are also located at the landing fields at Aguelock, Atar, Bamako, Birni N'Koni, Bobo-Dioulasso, Bouake, Conakry, Gao, Fort Gouraud, Niamey, Ougadougou, Port Etienne, St. Louis, Thies, Zinguinchor, and Zinder. In addition to direction finding, navigation aids of the French radio system in French West Africa include regular weather broadcasts and flight and landing directions by the international Q-code. Meteorological reports, issued daily by the Service Meteorologique at Dakar, are also broadcast from each colonial capital.

The frequency of 333 kilocycles, guarded by all stations for use in aircraft protection, is used by planes in flight to obtain bearings and send distress calls. The ground stations reply on 336 kilocycles. Air-ground traffic communications, on the other hand, are usually made on 6,510 kilocycles, the ground station replying on 6,517 kilocycles. The same stations used for air-ground communications are also used for point-to-point traffic between airdromes using frequencies of 11,344 and 5,630 kilocycles.

All French communications dealing with aircraft protection and traffic, whether air-ground or point-to-point, are continuous wave using Morse code.

Sea Navigation Aids

Ship-shore communication prior to the war was handled by the Cap Manuel station of the Service des Transmissions. During the war this service has been conducted by the French Navy and the staff of the British Naval Liaison Officer. It is believed that ship-shore communication will remain a naval function and not be returned to the Service des Transmissions.

Private Communications

Railroad Communications

A service of the Government General, the Direction des Chemins de Fer de l'Ouest Africains, which operates all railroads in French West Africa, has its own telegraphic system which follows the tracks. A direct line extends from Dakar to St. Louis and from Dakar to Bamako. The total length of the railroad lines provides an indication of the length of the accompanying telegraph lines as follows:

System	Approximate length (miles)
Dakar-Niger	1,056
Abidjan-Bobo Dioulasso	497
Conakry-Kankan	373
Porto-Novo, Contonou, Parakou	342
Lome-Sokode	249
Total	2,517

The line from Abidjan to Bobo Dioulasso is equipped for telephone, but service traffic on other lines of the railroad is by telegraph. The railroads have ordered radio transmitters to assist them in their own communications systems. While there is no connection between the railroad telegraph circuits and those operated by the Service des Transmissions, the telegraph operators at railroad stations can, in emergency, handle private messages and pass them on to the telegraph agency.

News Services

A radio monitoring bureau operated under the Service des Informations receives and edits news broadcasts which are turned over to the one daily newspaper, *Paris-Dakar*. There are no leased wires to news services, but the daily news bulletins prepared by the Service des Informations are sent over the Federal Network of radio stations and to the public telegraph offices.

Police Services

There is no special police communications network.

Time Signals

Neither calibrated wave signals nor regular observatory time signals are broadcast in French West Africa. The announcer of Radio Dakar gives the

Digitized by Google

time at the beginning of broadcasts. For precise time signals, however, the Colonies depend on time signals broadcast from Metropolitan France.

Manufacturing and Repair

There is no manufacture of either radio, telephone, or telegraph equipment. Many of the radio transmitters of the Service des Transmissions have been assembled from spare parts of different makes. No essential part, such as radio tubes or quartz crystals, can be made in French West Africa, and breakdowns are frequent in all branches of telecommunications because of the wearing out of such essential parts. Acute shortages have been experienced in tubes, batteries for the telegraph system, and paper tape used in the automatic cable transmissions.

Material and Labor Supply

The only equipment which can be manufactured locally consists of telephone poles which are cut and set up from material at hand. The poles are untreated and are not entirely satisfactory. Moreover, since vast areas of French West Africa are treeless, bushes or whatever the land can provide must be used for support of the lines.

Of the personnel employed, all but supervisory positions are now filled by natives. They are trained at industrial schools and are then given further training within the service itself. The delay in the handling of telegrams is to be attributed more to the volume of traffic and the condition of the lines than to the caliber of the operating personnel.

Digitized by Google

Appendix

[Radio Installations of the Federal Network, French West Africa]

Colony and name of station	Transmitter	Call letters	Antenna power (Watts)	Frequency (Kilocycles)
DAHOMEY				
Cotonou	I	FGF	500	6,517
		FGF3		7,937
		FGF6		13,118
	II	FGF4	400	13,043
	III	FGF	400	7,895
	IV	FGF	400	5,263
				6,976
	V	FGF	500	340
				336
				500
Kandi	—	TXA	150	336
				333.3
	—	TXA7	75	6,517
				5,263
				6,976.7
Natitingou	—	TXD6	75	6,896.5
Porto Novo	—	TXA9	2	5,263
Tchaourcu	I	TXC	100	5,263
				6,517
				8,108
				11,235.9
				333.3
				336
	II	TXC2		6,908.7
				8,108
GUINEA				
Boke	—	TXF4	50	5,407
				2,722
Conakry[1]	I	FGC3	500	5,921
		FGC7		8,850
		FGC8		11,500
	II	FGC4	50	5,700
	III	FGC	50	6,517
	IV	FGC5	50	7,500
		FGC2	50	5,172
	V	FGC	60	6,517
				5,921
	VI	FGC	400	500
				340
				336
	VII	FGC	500	336
				333.3
				336
Dabola	—	TXD	160	4,166.6
				5,263
				6,517
				8,108
Kankan	I	TXE	120	340
				336
	II	TXE	100	2,722
				6,517
	III	TXE	500	336
	IV	TXE		2,722
		TXE2	50	5,407
		TXE3		10,230
Kissidougou[2]	—	TXC8	20	5,338
				6,742
Gaoual	—	TXE4	50	2,722
		TXE5		5,401
		TXE6		10,230
Gueckedou	—	TXE7	10	5,769
				6,742
				7,500
Labe	—	TXF2		2,722
		TXF2	50	5,407
		TXF3		10,230
Macenta		TXC5		2,722
		TXC6	50	5,407
		TXC7		10,230
N'Zerekore	—	TXF7	10	5,000
				5,882
				7,407
Siguiri	—	TXC4	50	5,952
				9,950
IVORY COAST				
Abidjan[3]	I	FGS3		7,832
		FGE4	500	9,260
		FGE6		12,050
	II	FGS	200	336
				500
	III	FGE9		4,405
			150	6,517
		FGS		7,894
		FGS6	400	7,894
		FGS	500	340
	IV			375
				500
		FGS2		5,172
		FGS5	400	11,538.4
	V	FGS	400	6,517
	VI	FGS2	600	5,263
	VII	FGE	10	5,769
	VIII	FGS2	10	5,263
Bobo-Dioulasso[1]		FSW	150	333.3
				336
				5,263
				6,517
				8,108
				11,236
Bouake[1]	—	TXB	100	6,517
				5,263
				8,108
				11,236
Grand-Lahou	—	TXB6	10	4,542.5
Ouagadougou	—	FSX	150	333.3
				336
				5,263
				6,517
				8,108
				11,236
Sassandra	I	TXA2		4,280
				5,172
		TXA3	100	7,692.3
		TXA1		8,823.5
	II	TXA2		5,172
		TXA3	100	7,692
		TXA4		8,823
Tabou	I	FGD	450	333
				336
				500
				5,263
				8,108
		FGD2		4,280
				6,517
	II	FGD2	200	4,280
				5,172
				5,882.3
		FGD3		7,682.3
				8,823.5
MAURITANIA				
Akjoujt	—	FGU3	30	5,882.3
				7,692
Aleg[2]	—	FGG6	25	5,084.7
				8,695.6
				10,344.8
Atar[1]	I	FGH2	500	6,696
	II	FGH	100	333.3
				336
				333.3
				336
	III	FSZ	150	5,263
				5,660
				6,517
Boutilimit[2]	—	FGL6	10	4,000
		FGL7		5,172
		FGL8		6,818
		FGL8		7,894

Digitized by Google

Appendix

[Radio Installations of the Federal Network, French West Africa]

Colony and name of station	Transmitter	Call letters	Antenna power (Watts)	Frequency (Kilocycles)
Chingueti	—	FG12	50	5,769.2
		FG13		2,375
		FG14		10,900
Fort Gouraud	I	FGM6	10	5,000
		FGM7		5,445
		FGM8		5,769.2
		FGM9		7,894
	II	FSY	150	333.3
				336
				5,263
				5,660
				6,517
Kiffa	—	FGV2	10	5,769
		FGV2		6,000
		FGV2		7,792
		FGV2		7,894
		FGV3		8,823.5
Nouakchott[1]	I	FGZ2	5	4,385.7
		FGZ3		5,000
		FGZ4		5,455
		FGZ4		7,407
	II	FGZ	100	333.3
				336
Port Etienne	I	FSP	1,000	340
				336
				425.5
		FGB		500
	II	FSP	500	4,000
				5,263
				6,517
				8,108
				11,344
	III	FSP	300	2,830
				5,263
				6,517
				6,760
				8,108
				11,344
	IV	FSP	250	340
				500
				3,255
				5,650
				5,810
				6,517
				6,760
				8,108
Rosso[2]	—	FGV2	10	5,455
				7,895
Tamchakett	—	FG16	30	7,425.54
Tichitt	—	FGV6	20	5,357
		FGV7		5,769.2
Tidjikja	—	FGD6	4	5,000
		FGD7		5,882.3
		FGD8		7,317.1
				8,196.7
NIGER				
Agades		FGP2	50	5,615.3
		FGP3		5,769.2
		FGP4		6,976.7
		FGP5		8,695.6
		FGP		5,263
				8,108
				6,517
Birni N'Koni	—	FHF	300	8,108
				6,517
				3,263
				500
				336
				333.3
Bilma	—	FGQ2	50	4,285.7
		FGQ3		5,769.2
		FGQ4		7,000
		FGQ5		10,344.8
		FGQ		5,263
				8,108
				6,517
Niamey	I	FGR3	150	5,263
		FGR4		6,976.6
		FGR5		10,714
	II	FGR7	150	5,650
		FGR8		8,475
		FGR9		11,300
	III	FGR	800	6,517
		FGR6		9,775
Niamey—Continued	IV	FGR	400	333
				336
				5,263
				6,517
				8,108
				11,319
	V	FGR	1,000	333
				336
Tahoua	—	FGO2	50	6,976.7
		FGO3		10,169.4
				6,517
Tanout	—	FGT6	—	5,000
				6,876.7
Zinder[1]	I	FGN2	100	4,166.6
		FGN		5,263
		FGN		6,517
	II	FGN3	100	5,769.2
		FGN4		6,681.5
		FGN5		7,500
		FGN6		10,714
	III	FGN	500	8,108
		FGN		11,195
				10,714
		FGN6		11,538
	IV	FGN	700	340
				336
			200	340
				336
SENEGAL				
Dakar[1]	I	FGA4	500	5,405
		FGA		7,557
		FGA6		8,695
		FGA7		9,375
	II	FGA4	500	5,405
		FGA7		9,375
		FGA9		13,345
	III	FGA5	200	6,696
		FGA6		8,695
	IV	FGA3	500	4,166
		FGA4		5,405
		FGA5		6,696
		FGA7		9,375
		FGA		10,910
	V	FGA8	300	8,890
		Radio Dakar	200	
	VI	FGA	500	500
				525.5
				375
	VII	FGA	1,000	500
				425.5
				375
				336
				290
	VIII	Radio Dakar	12,000	15,345
Kaolack	—	FST	100	333.3
				336
				5,263
				6,517
				8,108
				11,235.9
Saint Louis (Aeradio)[1]	I	FSQ	1,000	500
				375
				340
				336
	II	FSQ	500	5,263
				5,650
				6,517
				11,344
Saint Louis	I	FGT5	150	8,000
		FGT3		5,455
	II	FGT5	50	8,000
		FGT3		5,455
Tambacounda	—	FSU	100	4,615.3
				5,263
				6,517
				8,108
				11,235.9
				333.3
				336

Digitized by Google

Appendix

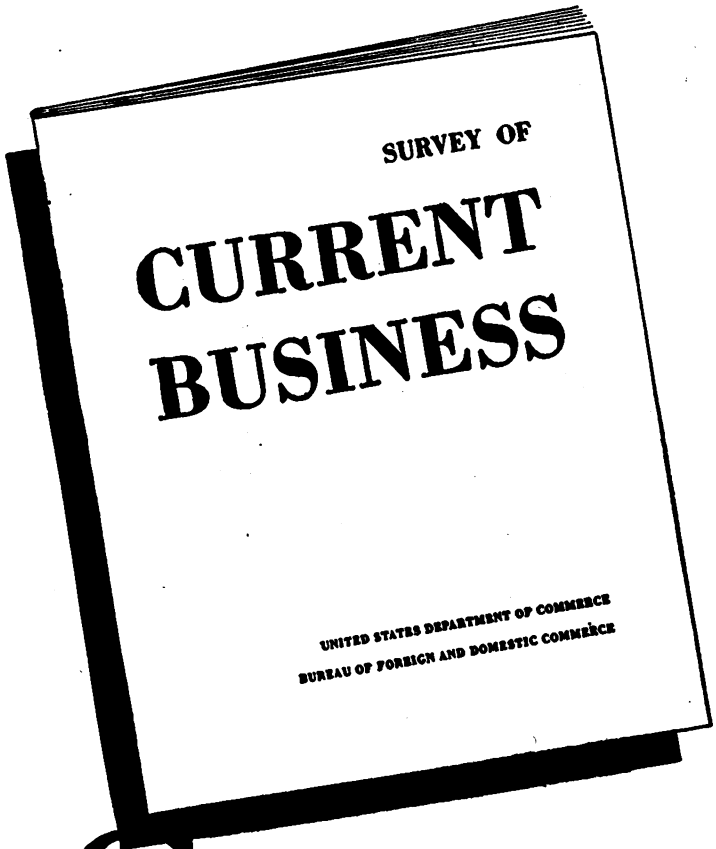
[Radio Installations of the Federal Network, French West Africa]

Colony and name of station	Transmitter	Call letters	Antenna power (Watts)	Frequency (Kilocycles)
		FGX		2,525.2
				4,167.2
				5,263
				5,454.5
	I	FGX3	15	6,250
		FGX		6,517
		FGX4		6,976
		FGX		8,108
		FGX		336
				500
Zinguinchor[1]	II		75	5,236
				5,454.5
		FGX3		6,250
				340
				336
	III	FGX	150	375
				428.5
				500
SUDAN				
				336
				333.3
				5,660
Aguelock	—	FSS	160	6,517
				6,666.6
				11,110
				11,236
				5,769.2
		FGL2		6,976.7
Araouane	—	FGL3	50	9,090.9
		FGL4		5,769
		FGJ3		6,813.1
	I	FGJ4	500	8,308.1
		FGJ6		10,033.4
	II	FGJ7	500	11,405
		FGJ8		13,333
	III	FGJ	300	4,839
				10,169
	IV	FGJ5	300	9,440
Bamako	V	FGJ	400	333.3
				336
				4,839
				5,263
				5,357
	VI	FGJ	350	5,769
				6,517
				8,108
				11,236
		FGJ2		5,357
	VII	FGJ9	350	15,030
	I	FGK6	100	11,650
		FGK5		10,344.8
		FGK2		5,263
		FGK		6,517
Kabara	II	FGK3	60	6,741.5
		FGK4		7,500
		FGK		8,108
		FGK2		5,263
	III	FGK3	50	6,741.5
		FGK4		7,500
		FGK		8,108
				333.3
				336
Kayes	—	FSV	100	5,263
				6,517
				8,108
				11,235.9
	I	FGW2	500	6,666
				6,976
		FGW3		9,375
		FSR		3,297
				3,750
				5,263
				8,108
	II	FGW2	200	6,666
				6,976
		FGW3		9,375
				6,517
Gao		FSR		11,280
				14,285
	III	FSR	200	333.3
				336
				6,517
				8,108
	IV	FGW2	40	6,666
				6,976
		FGW3		9,875
		FGU6		4,477.6
Hombori	—	FGU7	10	6,976.7
		FGU8		9,090.9
		FGM2		5,769.2
	I	FGM3	60	6,742
		FGM4		7,317.1
Kidal		FGM5		8,196.7
	II	FGM		5,263
				8,108
				6,517
		FGX6		4,286
Menaka	—	FGX6	10	5,769
		FGX7		6,681.5
		FGG2		5,357
		FGG3		5,769
Nema		FGG4	50	8,571.4
				8,108
		FGG		5,263
				6,517
Nioro	—	FGO6	10	6,976.7
		FGO7		7,894
Timbedra	—	FGP6	4	4,769.2
		FGP7		6,681.5
TOGO				
	I	FHB	500	13,043
	II	FHA	500	500
				340
Lome				336
	III	FHA	500	5,263
				6,517
				8,000

[1] Equipped with direction finder.
[2] Closed temporarily.
[3] F Z K Dakar is in contact with Abijan on 11,475 kilocycles.

☆U. S. GOVERNMENT PRINTING OFFICE: 1946—679533—127

Digitized by Google



$2.00
per year

SURVEY OF CURRENT BUSINESS

THIS AUTHORITATIVE MONTHLY PERIODICAL makes easily available to businessmen over 2,200 comprehensive facts about production, stocks, orders, prices, sales, shipments, etc., of the industries of the United States by means of text, tables, charts, and index numbers.

A sample copy will be sent, on request to the
Bureau of Foreign and Domestic Commerce,
Washington, D. C.

$2.00 per year, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Digitized by Google

Domestic Commerce

written for

BUSINESSMEN . .

● Here is an authoritative monthly periodical written in the language of the American businessman. It is one of the principal organs of the Department of Commerce for disseminating information deemed of importance in maintaining a vigorous and dynamic free enterprise system.

● Domestic Commerce gives the reader an understanding of the progress and changing conditions of industry and business of the United States. Its writers are officials of this and other Government agencies, and specialists in the various subjects covered.

● Particular attention is given to developments in the field of post-war planning.

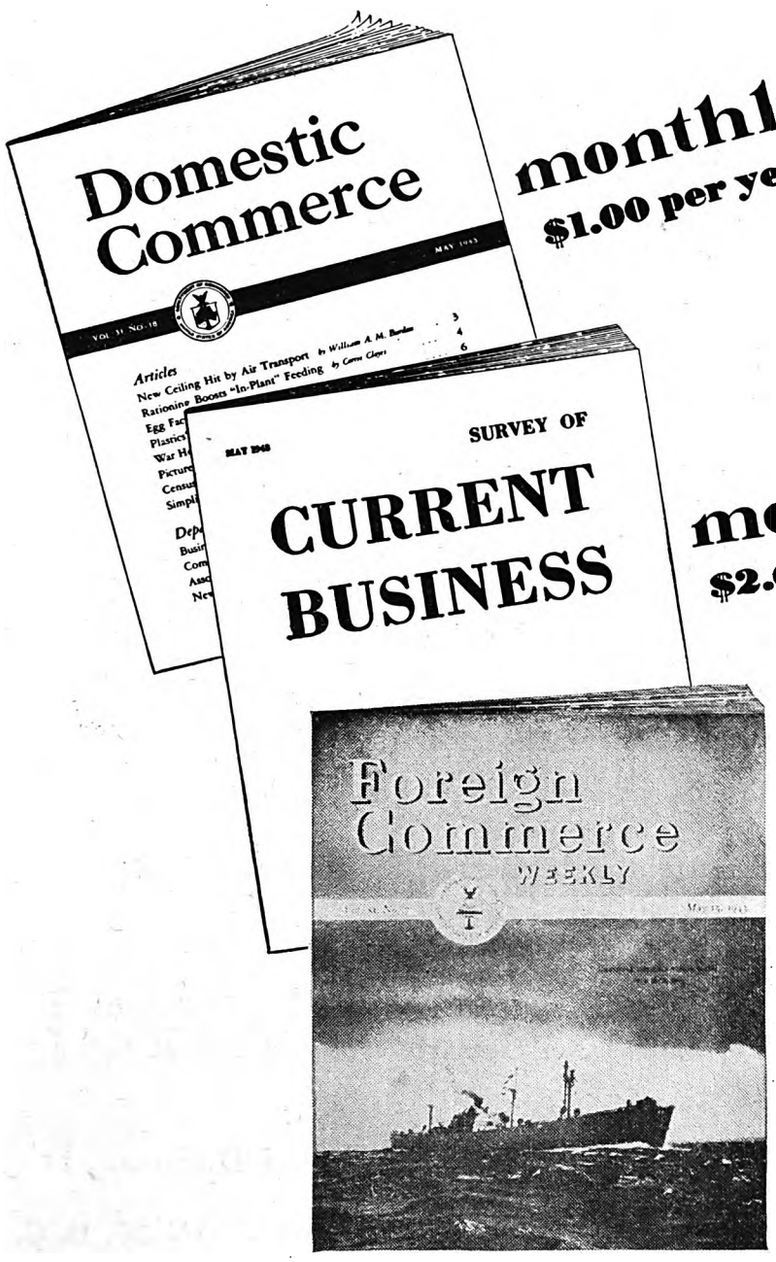
A sample copy will be sent you upon request to the Bureau of Foreign and Domestic Commerce, Washington 25, D. C.

$1.00 per year . . . from the Superintendent of Documents

U. S. GOVERNMENT PRINTING OFFICE • WASHINGTON 25, D. C.

Digitized by Google

Business
PUBLICATIONS



monthly:
$1.00 per year

monthly:
$2.00 per year

weekly:
$6.00 per year

DEPARTMENT OF COMMERCE

Digitized by Google

Documents Room

Industrial Reference Service

U. S. DEPARTMENT OF COMMERCE, HENRY A. WALLACE, *Secretary*
Bureau of Foreign and Domestic Commerce, AMOS E. TAYLOR, *Director*

Part 1. TRANSPORTATION and PUBLIC UTILITIES

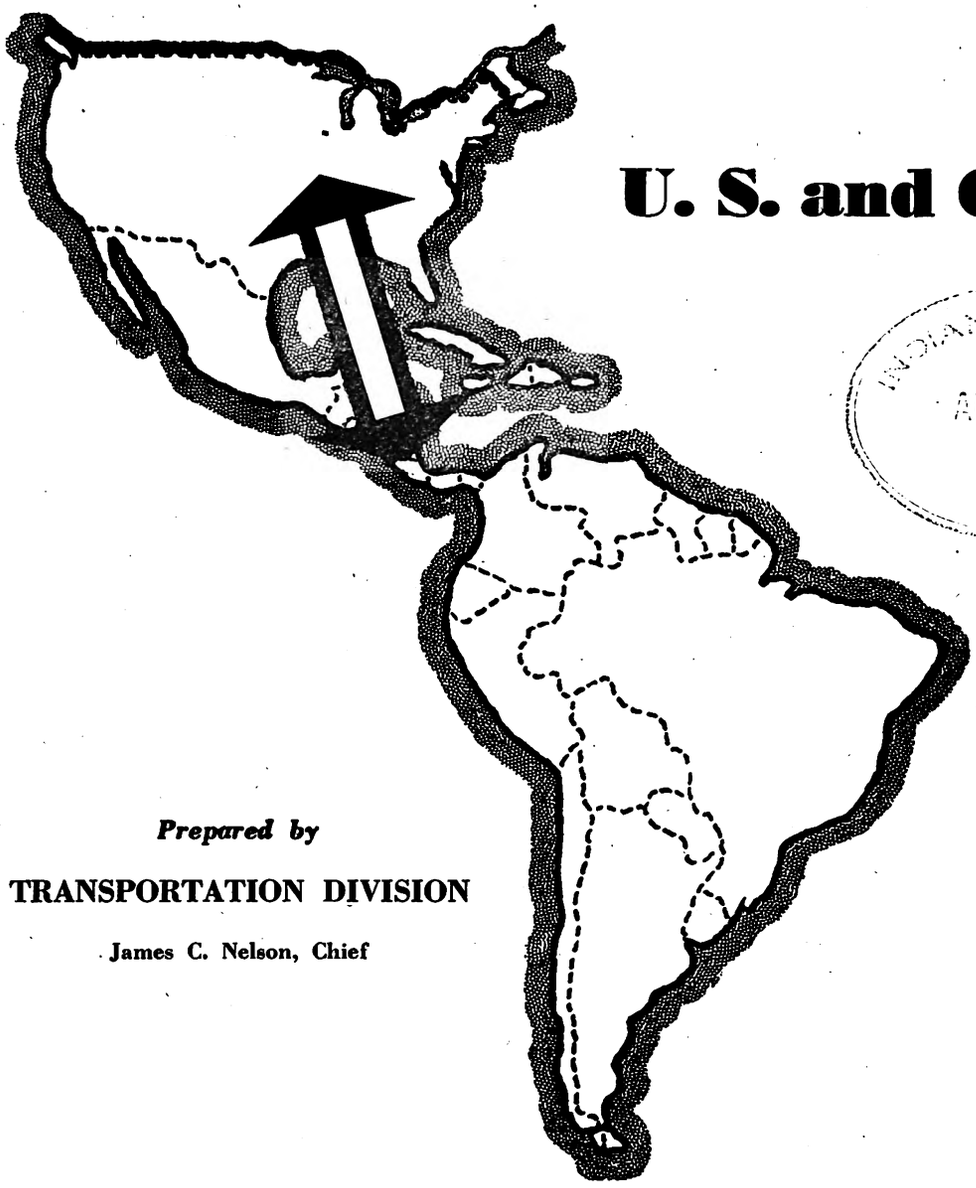
Available in Parts Covering Selected Services and Commodities
Annual Subscription $1.50. Price this report 5 cents
For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., or Department Field Offices

Volume 4—Part 1 | March 1946 | Number 6

AIR-CARGO POTENTIALS

between the

U. S. and COSTA RICA



INDIANA UNIVERSITY
APR 2 1946
LIBRARY

Prepared by

TRANSPORTATION DIVISION

James C. Nelson, Chief

D. 12504

Digitized by Google

Air-Cargo Potentials Between the United States and Costa Rica

By Katherine A. Fitzgerald

Costa Rica extends 19,238 square miles along the central plateau of Middle America in a slanting, generally north to south position. It is bordered on the north by Nicaragua, on the northeast by the Caribbean, on the west and southwest by the Pacific, and on the southeast by Panama. Lowland jungles, plateaus, volcanic mountains and basins, which include the largest volcanic crater in the world, characterize Costa Rica's topography.

The country has several large rivers. The larger rivers are mostly navigable, some for many miles inland by small vessels. There are also many smaller rivers and waterfalls. Costa Rica has certain rights in the Rio San Juan, which rises across the border in Lake Nicaragua, flows along the northeastern boundary between Costa Rica and Nicaragua on the Nicaraguan side.

Along the Pacific are coastal plains and at the Caribbean are hot, steamy lowlands. On the mountain-enclosed interior plateaus of about 3,000 to 4,000 feet elevation live approximately 75 percent of the country's 725,149 inhabitants. The people of Costa Rica are almost entirely white. Land ownership is widespread and there are relatively few large estates.

The principal east-coast port is Puerto Limon on the Caribbean, which serves ships from the West Indies, Europe, and the east coasts of the United States and South America. The principal Pacific port is Puntarenas, serving Panama and the west coasts of the United States and South America. San Jose, the Republic's capital, is located in the highlands about 72 miles by rail from Puntarenas and about 100 miles from Puerto Limon.

Costa Rica is basically agricultural and has a year-round planting climate. About a million acres are under cultivation, and 3 million acres are grasslands.

The highland areas have productive soil of volcanic origin and a climate of perpetual spring. Cinchona for quinine is being cultivated here, along with general truck farming and dairying. Banana plantations are being developed in the Pacific Coast area, while in the isolated Caribbean lowlands, almost another country to the plateau people, bananas are being replaced by cacao (cocoa), rubber, and abaca.

Customs duties and surcharges are the principal source of Government revenues; other important items are liquor taxes and income from the Pacific Railway. In 1939, customs duties and surtaxes accounted for 47½ percent of the total, but in 1944 receipts from this source declined to 37 percent.

The United States is Costa Rica's chief customer and supplier. In proportion to its population, Costa Rica has the largest foreign trade of all the Central American Republics, except Panama, and in 1939 claimed 15 percent of the value of all commodities exported from the six Central American countries and 22 percent of the value of their imports. Coffee, bananas, and cacao are the main crops and, along with rubber, ipecac, and mahogany, are exported in leading volume to the United States.

Costa Rica's imports from the United States are chiefly manufactured products and foodstuffs. These include aircraft accessories and parts (including engines), radio apparatus and parts, motor vehicles and parts, wearing apparel, motion picture films, medical equipment and supplies, periodicals, and textbooks.

Like other Central American countries, Costa Rica has a major transportation problem. There are airlines and railroad, bus and truck transportation, approximately 300 miles of all-weather highways, and the north-south Inter-American Highway is under construction, but dense vegetation and virgin forests make river passage and overland foot traffic from north to south still necessary in some sections. The airplane is bringing great relief to the country's transportation problems by conquering topographic barriers. Now, produce can be carried by air to marketing centers and machinery and equipment to isolated farms.

Costa Rica is an air-minded country with three important airline services, two international airports, and many landing fields. There is north and south international service through San Jose with direct lines to Mexico City and Brownsville. From San Jose to New York City, air travel time is 26 hours. Night service between New Orleans and Balboa, Canal Zone, via San Jose, also benefits Costa Rica. Internal Central American air service has Costa Rica on its schedule. An internal Costa Rican air service is maintained on the west coast. A Mexican airline is negotiating for rights to operate through Costa Rica from Mexico to Panama.

Sabana airport, an international one, is on the outskirts of San Jose and construction of an alternate airport is being considered. The other international airport, Santa Ana, is about 15 miles west of San Jose. There is an airport south of Puerto Limon, about 45 minutes flying time from San Jose, and seaplanes may land in Puerto Limon Bay.

While there are many landing fields throughout the country, their size and condition makes them unsuitable for commercial traffic.

Background of the Series

The appendix contains an explanation of the purpose of this series of reports on air-cargo potentials. It gives a description of the criteria applied in selecting the commodities classified as air-cargo potentials, and mentions a number of points of interest to the users of the reports. It is suggested that readers consult that appendix for the methods used and for factors to be considered in formulating conclusions based upon the data contained in any individual report of the series.

In all cases, it should be noted that the statistics in the reports refer to air-cargo *potentials* and not to cargo actually carried by air in 1939. Failure to observe this fact has led to misinterpretation of the figures in the reports on some occasions.

Particular attention should be given to the bases for selection of commodities according to the following categories: Fragility, perishability, and style or obsolescence characteristics. In making these studies, all of the commodities having fragility, perishability, and style or obsolescence characteristics are included under such categories as air-cargo potentials, regardless of value per pound. However, an analysis of the value per pound of individual commodities should nevertheless be made to determine whether all of the items included can properly be considered as potential air cargo under the cost, competition, and equipment conditions of the immediate future.

For instance, it is unlikely that such cargo as bananas will be shipped in volume by air in the near future in view of their low value of approximately $0.01 per pound. The same consideration might apply to grapes, which also have a low value per pound, or to such low-priced export items as lard or dynamite (classified as perishable and fragile, respectively). However, all these commodities have been included in their respective categories for the sake of statistical completeness and because under some conditions they might be shipped by air.

Digitized by Google

In analyzing commodities especially for countries bordering on the Caribbean Sea, it should be noted that bananas comprise a very large proportion of the perishable cargo, and, if these were eliminated, there would be a large reduction in total weight of this class of cargo. However, the value of the perishable cargo remaining would not be reduced in the same proportion. In other words, the unit values for the remaining perishable items would be comparatively high.

Attention is called also to the schedule of values. These studies, aside from the three special groups, include only articles valued at $0.50 or more per pound. While the higher-value articles probably would make up the major portion of the air cargoes, especially during the early development of this trade, values as low as $0.25 per pound are being considered in similar studies as indicating potential air-cargo and some cargo with as low or lower values per pound actually does move by air under present conditions.

Potential Air Cargoes

Civilian commercial air transportation has been retarded because of the war, but in 1939 the value of United States exports to Costa Rica classified in this report as air-cargo potentials showed only a slight balance in favor of the United States, the value of imports being $1,695,955 against exports of $1,736,804.

Table 1 summarizes potential air cargo between the United States and Costa Rica in relation to total trade in 1939, and actual air trade in relation to total trade in the entire year 1944 and the first 5 months of 1945.

In 1939, total trade between the United States and Costa Rica was valued at $12,934,641 for 1,344 items. United States exports to Costa Rica of 1,306 items amounted to $9,705,251 and of these, 394 items weighing 6,697,018 pounds and valued at $1,736,804 are classed as air-cargo potentials. Of the 394 items, 345 are valued at 50 cents and more a pound and 49, consisting of 22 perishables, 25 fragiles, and 2 commodities having style or obsolescence factors, at less than 50 cents per pound.

The average value of the total export air potentials is 26 cents a pound. Certain items, because of their bulk or weight and low value per pound, are responsible for this low average. These items include glass containers, electric incandescent lamps, dynamite, lard, and some vegetables and fruits.

Import items from Costa Rica to the United States in 1939 totaled 38 and amounted to $3,229,390. They include 17 commodities classed as air-cargo potentials having a value of $1,695,955 and weighing 185,273,239 pounds. Of this number, there are 2 perishable items, both having values of less than 50 cents per pound, and 3 fragiles, and 2 commodities with style factors, all valued more than 50 cents per pound. The perishable commodity, bananas, represents more than 95 percent of the weight and value of the air import potentials, but has little possibility for air shipment at present air charges.

In 1944 and the first 5 months of 1945 total trade between the United States and Costa Rica amounted to 453,671,832 pounds valued at $30,785,000. United States exports to Costa Rica during that period were valued at $18,201,000 against a value for imports of $12,584,000. The total trade included 224,351 pounds of air-shipped cargo valued at $1,010,461, of which 218,479 pounds valued at $980,337 were air exports and 5,872 pounds valued at $30,124 were air imports. These were represented by all types of commodities and averaged $4.49 for exports and $5.13 for imports.

TABLE 1.—*Potential Air Cargo Between the United States and Costa Rica in Relation to Total Trade in 1939 and Actual Air Trade in Relation to Total Trade in Specified Periods of 1944 and 1945*

Summary item	Number of commodities	Shipping weight (Gross pounds)	Value
1939			
United States trade with Costa Rica, total	1,344	[1]	$12,934,641
United States exports	1,306	[1]	9,705,251
United States imports	38	[1]	3,229,390
Air-cargo potentials, total	411	191,970,257	$3,432,759
United States exports	394	6,697,018	1,736,804
United States imports	17	185,273,239	1,695,955
Percentage of total trade represented by air-cargo potentials, total	30.6	[1]	26.5
United States exports	30.2	[1]	17.9
United States imports	44.7	[1]	52.5
1944–45 [2]			
United States trade with Costa Rica, total	[3]	453,671,832	$30,785,000
United States exports	[3]	214,434,327	18,201,000
United States imports	[3]	239,237,505	12,584,000
Actual air trade, total	731	224,351	$1,010,461
United States exports	614	218,479	980,337
United States imports	117	5,872	30,124
Percentage of total trade represented by air trade, total	[1]	0.49	3.28
United States exports	[1]	.10	5.39
United States imports	[1]	[4]	.24

[1] Not available.
[2] January 1944 through May 1945.
[3] 1944 exports totaled 1,519, and imports totaled 148. The number of items for the year 1945 is not available so a total for both periods may not be computed.
[4] Less than 0.01 percent.

Export Commodities

Potential air export commodities for 1939 valued at $0.50 per pound or more weighed 1,083,947 pounds and had a value of $1,327,772, representing 16 percent and 77 percent, respectively, of the weight and value of total air-cargo potential exports from the United States to Costa Rica. Their average value per pound was $1.22. Of these exports valued 50 cents or more per pound, 98 percent of the weight and 68 percent of the value occurs in the value per pound range $0.50–$2.99. Commodities suitable for air shipment within this range include leather, cigarettes, wearing apparel, portable tools, medical and reagent chemicals, engine accessories and parts, and piece goods of rayon and other synthetic fabrics.

In the value range group $25 per pound and over are found less than 0.05 percent of the weight but 19.1 percent of the value of potential exports by air valued 50 cents or more per pound. Some of the commodities in this group are Diesel and semi-Diesel engines, business machines (bookkeeping, adding, typewriters), and aircraft engines.

The remaining value groups range from $3 to $24.99 and represent 2 percent of the weight and 13 percent of the value of total air potential exports valued at more than 50 cents per pound. Outstanding commodities in this range are wearing apparel including hosiery, aircraft accessories and parts, and receiving sets.

Of the 30 perishable air potential export items which totaled 4,162,648 pounds and had a value of $326,321, 22 had values less than 50 cents per pound. Their volume is mainly weighted by grapes, which averaged only 6 cents per pound, and lard, averaging 7 cents per pound. Neither are considered potential air cargo under existing air shipment costs. Serums and vaccines for human use and glandular produts are the perishable commodities having the highest values per pound.

The 86 fragile items amounted to 1,537,798 pounds and were valued at $337,561, 23 percent and 19 percent, respectively, of the volume and value of the total United States potential air export trade with Costa Rica. Fragile commodities valued at more than $0.50 per pound are 15.5 percent of the total number of air-cargo potential exports and include business machines (bookkeeping, typewriters), cash registers, and electric recording and indicating instruments. The less than $0.50 per pound items, representing 6.3 percent of the total number of potential air export items, include beverage bottles and glass containers, electric incandescent lamps for automobiles, flashlights, and Christmas trees. These seem doubtful air-cargo potentials under present cost of air transport.

There were 22 export commodities possessing style or obsolescence charac-

Digitized by Google

teristics but these represented only 0.6 percent of the weight of air-cargo potentials and 2.5 percent of the value. All but two have a value of $0.50 or more per pound. The noticeable commodities in this group were women's and children's wearing apparel, including handbags and hats, and exposed motion picture films. Catalogs, pamphlets, and calendars comprised the below $0.50 per pound items.

Import Commodities

Of the 38 commodities imported from Costa Rica to the United States in 1939, 17 were air-cargo potentials. They totaled 185,273,239 pounds and had a value of $1,695,955. Bananas, averaging 1 cent per pound, amounted to 184,947,229 pounds and had a value of $1,631,220. They represent by far the bulk of the total air-cargo potential import weight and value. Ninety-one percent of the volume of air potential imports valued at more than 50 cents per pound occurred in the value range $0.50 to $1.99. Ipecac and original sculptures or statuary are the noticeable commodities in this range.

There were no commodities imported from Costa Rica in the $4 to $4.99 per pound value group. In the other value ranges from $2 to $9.99 per pound, 791 pounds valued at $2,885 are classified as air-cargo import potentials. The only commodity which occurred in significant volume in these value groups was raw reptile skins. The outstanding value in the ranges of $0.50 and above are in the $10 to $24.99 group. The principal commodity of this value group is stamps, foreign postage, and foreign Government stamped envelopes.

Bananas and turtles comprised all of the perishable imports and are the only items shown on the potential air-import list in the less than $0.50 per pound value group. Their bulk and low value per pound make them unsuitable air cargo.

Orchid plants, averaging $34.50 per pound, are the outstanding fragile air-potential import commodity. Motion picture films, averaging approximately $15 per pound, make up most of the relatively small volume of air-potential imports possessing a style or obsolescence factor.

TABLE 2.—*Actual Air Traffic between the United States and Costa Rica January 1944 through May 1945, by Value Groups*

Value per pound groups	Number of commodities	Shipping Weight		Value	
		Gross pounds	Percent of weight	Dollars	Percent of value
EXPORTS					
Less than $0.50	36	17,906	8.2	4,772	.4
0.50 to 0.99	65	18,072	8.3	13,650	1.4
1.00 to 1.99	105	31,527	14.4	47,157	4.8
2.00 to 2.99	96	23,325	10.7	56,451	5.8
3.00 to 3.99	71	30,770	14.1	103,723	10.6
4.00 to 4.99	47	18,278	8.4	79,906	8.2
5.00 to 9.99	125	68,173	31.2	451,634	46.1
10.00 to 24.99	46	8,183	3.7	116,134	11.8
25.00 and over	23	2,245	1.0	106,910	10.9
Total	614	218,479	100.0	980,337	100.0
IMPORTS					
Less than $0.50	8	441	7.5	77	.3
0.50 to 0.99	6	75	1.3	49	.2
1.00 to 1.99	20	371	6.3	478	1.5
2.00 to 2.99	21	3,134	53.3	8,574	28.4
3.00 to 3.99	22	933	15.9	3,069	10.2
4.00 to 4.99	7	62	1.1	262	.9
5.00 to 9.99	23	367	6.3	2,319	7.7
10.00 to 24.99	7	182	3.1	3,103	10.3
25.00 and over	3	307	5.2	12,193	40.5
Total	117	5,872	100.0	30,124	100.0

Actual Air Shipments

Data on actual exports and imports by air have been compiled by the Bureau of the Census since 1943, but they have been released only for selected months. Though the export data have been published only for the month of August 1944, and the import data for the months of July 1944 through June 1945, those for the remaining months in the period from January 1944 through May 1945 were compiled by the Transportation Division from the basic tabulations on file in the Census. Table 2 shows the actual air traffic between the United States and Costa Rica during the period January 1944 through May 1945, summarized by value groups.

It is observed from table 2 that the United States south-bound air traffic to Costa Rica during January 1944 through May 1945 far exceeded that moving north. There were more than five times as many export items as import commodities and the unbalance continued in even greater degree in the comparison of shipping weights and values. On the other hand, no such differences existed in the average values per pound. The air traffic to Costa Rica averaged $4.49 per pound and the return shipments by air averaged $5.13 per pound.

The greatest concentration of value and volume of actual air exports from the United States to Costa Rica during January 1944 through May 1945 was in the $5 to $9.99 value-per-pound group. Though the items in the lower value groups comprised a significant volume, the aggregate value of these low-value items was relatively small. Items valued $5 and more per pound made up more than 65 percent of the value of air exports. Synthetic hosiery, and aircraft instruments, accessories, and parts were the export commodities which were shipped in the largest volume.

More than 50 percent of the shipping weight of United States imports by air from Costa Rica during 1944 and the first 5 months of 1945 consisted of items valued from $2 to $2.99 per pound. This significant volume represented more than a quarter of the total value of the air imports during the period under consideration. There were no large volumes of any single item in the $2 to $2.99 per pound value class, but rather it was mainly weighted by items in the two basket classifications, "miscellaneous articles" and "United States articles returned." The largest dollar values of air imports were those for stamps and stamped envelopes, flower seeds, and antiques.

The principal air export and import commodities by value per pound groups are shown in tables 3 and 4.

TABLE 3.—*Principal Air Exports from United States to Costa Rica, January 1944 through May 1945*

Value per pound groups	Leading export commodities	Shipping weight (Pounds)	Value (Dollars)
	Grand total	218,479	980,337
Less than $0.50	Group total	17,906	4,772
	Nitro cellulose pyroxylin lacquers, pigmented, clear, thinner	4,840	1,148
	Chemical specialty compounds	2,173	427
	Iron and steel strip	1,832	216
	Chemical pigments	1,440	352
	Bolts, machine screws, nuts, etc.	1,254	599
	Periodicals	1,089	539
	Chemical specialty compounds	520	90
$0.50 to $0.99	Group total	18,072	13,650
	Excavator parts and accessories	2,607	2,367
	Aluminum sheets, plates, strips	1,976	1,196
	Parts for automobile replacement	1,953	1,777
	Periodicals	1,634	1,057
	Casings and tubes, except automobile	1,402	1,125
	Printed matter	753	595
	Wire manufactures and insulated wire	502	404
	Ice making, equipment and parts	273	242
	Parts for electric refrigerators	92	91

Digitized by Google

TABLE 3.—*Principal Air Exports from United States to Costa Rica, January 1944 through May 1945*—Continued

Value per pound groups	Leading export commodities	Shipping weight (Pounds)	Value (Dollars)
$1.00 to $1.99	Group total	31,527	47,157
	Tractor parts, etc., wheel	3,533	6,519
	Nickel chromium electric resistant wire	2,071	2,544
	Propeller parts and accessories	2,065	3,630
	Remnants, chief value synthetics	1,322	2,491
	Electric apparatus and parts	1,080	1,601
	Automobile parts for replacements	977	1,594
	Poultry, live	973	1,332
	Phonograph records, except motion picture sound, etc.	908	1,237
	Machinery parts, agricultural, except tractor	720	1,023
	Rebuilt typewriter parts	317	500
$2.00 to $2.99	Group total	23,325	56,451
	Woven synthetic yarn fabric	2,168	5,885
	Knit fabric	1,902	4,680
	Radio transmitting apparatus and parts, except tubes	1,504	3,019
	Woven filament, yarn fabrics	1,487	3,270
	Radio receiving tubes	951	2,499
	Rubber sundries, druggist	750	1,643
	Engines, internal combustion, accessories and parts	467	1,307
	Vegetable seeds	394	907
	Scientific, laboratory, professional instruments and supplies	360	1,071
$3.00 to $3.99	Group total	30,770	103,723
	Aircraft accessories and parts (propellers, instruments, etc.)	10,119	34,309
	Hosiery, men's socks	4,322	14,779
	Cotton shirts, men's, except knit	2,642	8,966
	Vegetable seeds	1,192	3,662
	Tools, mechanics', hand	894	2,979
	Engine accessories and parts	398	1,250
$4.00 to $4.99	Group total	18,278	79,906
	Synthetic textile manufactures	2,522	11,188
	Elixirs, liquid solutions	1,637	8,041
	Umbrellas and parasols	1,338	5,526
	Animal products, edible	837	4,056
	Handbags, etc., leather	538	2,274
	Shirts, except work shirts, men's and boys'	466	1,865
	Stereopticons, magic lanterns, etc.	424	1,712
	Woven spun yarn fabrics	210	839
	Motion picture films, negative, sensitized	142	697
	Leather manufactures	32	158
	Cotton woven fabric clothing, men's	16	76
$5.00 to $9.99	Group total	68,173	451,634
	Synthetic hosiery, except nylon, women's and children's	10,814	72,295
	Aircraft instruments and parts, engines and parts, accessories	10,293	58,275
	Synthetic dresses, not knit	3,715	29,024
	Neckties, mufflers, scarfs, etc.	2,587	18,637
	Medicinal chemical, prescription use	2,415	16,789
	Vitamins and vitasterols	1,826	11,233
	Jewelry, women's, synthetic rosin, etc.	1,657	15,526
	Women's and children's dresses and ensembles, except knit	1,476	13,758
	Proprietary medicinal preparations	1,305	8,338
	Corsets, brassieres, girdles, except rubber and rubberized	903	7,445
	Overcoats, suits, and pants, men's and boys'	801	4,728
	Fur felt hats, men's and boys'	779	6,704
	Women's and misses and children's apparel, except knit	460	2,780
	Belts, leather	408	2,225
	Handkerchiefs, cotton	276	1,398
	Women's and children's handbags, leather	263	1,380
	Braids, ribbons, trimmings, etc.	207	1,466

TABLE 3.—*Principal Air Exports from United States to Costa Rica, January 1944 through May 1945*—Continued

Value per pound groups	Leading export commodities	Shipping weight (Pounds)	Value (Dollars)
$10.00 to $24.99	Group total	8,183	116,134
	Medicinal chemicals for prescription use	1,744	19,320
	Fur wearing apparel	1,088	19,967
	Vaccines, human use	826	10,475
	Serums, antitoxins, human use	616	10,537
	Eyeglasses, etc., and frames	558	11,638
	Radio transmitting sets	426	4,868
	Cotton hosiery, women's	324	3,349
	Men's and boys' fur felt hats and hat bodies	252	3,005
	Needles, sewing machine	238	3,760
	Needles, except sewing machine	137	2,883
$25.00 and over	Group total	2,245	106,910
	Pens, fountain, stylographic, of plastic	584	31,705
	Teeth	261	7,836
	Jewelry, solid gold or platinum	109	15,107
	Fur wearing apparel	77	3,432
	Dental metals, precious	47	8,360
	Gold manufactures	17	1,657

TABLE 4.—*Principal United States Air Imports from Costa Rica, January 1944 through May 1945*

Value per pound groups	Leading import commodities	Shipping weight (Pounds)	Value (Dollars)
	Grand total	5,872	30,124
Less than $0.50	Group total	441	77
	Palm nuts	250	39
	Cocoa, unsweetened	71	12
$1.00 to $1.99	Group total	371	478
	Hydraulic turbines, wheels	50	50
$2.00 to $2.99	Group total	3,134	8,574
	Cut flowers, dried, fresh	53	118
	Albums, photograph, autograph, scrap, etc.	94	265
	Wood or bark manufactures	23	63
$3.00 to $3.99	Group total	933	3,069
	Orchid plants	95	327
	Albums, photograph, etc.	7	23
$5.00 to $9.99	Group total	367	2,319
	Handbags, women's and children's, not reptile	16	102
	Newsreel, undeveloped, American, exposed abroad	113	688
	Seeds	29	235
$10.00 to $24.99	Group total	182	3,103
	Stamps and stamped envelopes, foreign	139	2,454
	Silver manufactures	12	140
	Leather handbags, reptile	7	140
	Coin purses, etc., of leather, other than reptile	7	88
$25.00 and over	Group total	307	12,193
	Flower seed	107	2,997
	Stamps and stamped envelopes, foreign	32	2,335
	Antiques	9	2,475

The Return-Haul Problem

The unbalance which is typical in the air trade between the United States and Latin American countries also presents a problem for Costa Rica. There were 497 more United States air exports to Costa Rica than air imports from that country during January 1944 through May 1945. The air exports for that period exceeded the air imports by 212,607 pounds and $950,213, with air imports only 3 percent of the volume and of the value of air exports.

Although the value of air-cargo potential exports as of 1939 ($1,736,804) exceeded the air potential imports ($1,695,955) by only $40,849, bananas were the major factor in the import total. Without this low-valued item, which is not likely to move by air in any volume, the potential air import figures would have been reduced to 326,010 pounds valued at $64,735. The resulting relationship between potential exports and imports shows an appreciable overbalance of potential air exports. And, as was the case in the actual air movements for 1944 and 1945, the number of items considered as air potentials for export is far greater than those for import.

The potential air-cargo picture evidences a much greater tonnage in low-value items than was actually moved by air in the 17-month period during 1944 and 1945. The transportation of many of those items by air awaits sufficient reduction in air-cargo rates to make that mode of shipment attractive to shippers. Reductions in freight rates would increase the air shipment of the lower-valued items which represent a significant part of the potential air imports listed in this report.

Digitized by Google

Summary

Potential air trade between the United States and Costa Rica as of the year 1939, after the exclusion of unlikely air-cargo commodities, totaled 1,664,424 pounds valued at $1,449,116. Particular items excluded were lard, grapes, glassware and dynamite from the export list, and bananas from the import list. The overbalance of exports, which was present in the total trade between the two countries as well as in the original unadjusted air-cargo potential picture, is also present after these adjustments were made. The same return-haul problem was revealed in the data on actual air shipments.

It appears quite probable that air exports to Costa Rica will continue to exceed air imports from that country.

TABLE 5.—*United States Trade With Costa Rica—1939*

[Summary of commodities valued $0.50 or more per pound—category 1]

Category 1	Commodities			Shipping weight		Value		
	Number	Percent of air-cargo potentials	Percent of total trade	Gross pounds	Percent of air-cargo potentials	Dollars	Percent of air-cargo potentials	Percent of total trade
EXPORTS								
Group—Value per pound:								
1....$ 0.50 to $ 0.99	132	33.5	10.1	746,152	11.2	504,262	29.2	5.2
2.... 1.00 to 1.99	93	23.6	7.1	281,151	4.2	329,605	19.1	3.4
3.... 2.00 to 2.99	32	8.1	2.5	29,078	.4	67,692	3.9	.7
4.... 3.00 to 3.99	19	4.8	1.4	11,817	.2	39,681	2.3	.4
5.... 4.00 to 4.99	9	2.3	.7	4,215	.1	18,276	1.1	.2
6.... 5.00 to 9.99	19	4.8	1.5	4,941	.1	34,141	2.0	.4
7.... 10.00 to 24.99	11	2.8	.8	5,001	.1	80,246	4.7	.8
8.... 25.00 and over	30	7.6	2.3	1,592	(1)	253,869	14.7	2.6
Total valued $0.50 or over	345	87.5	26.4	1,083,947	16.3	1,327,772	77.0	13.7
Total air-cargo potentials [2]	394	100.0	36.9	6,697,018	100.0	1,736,804	100.0	21.0
Total exports to Costa Rica	1,306	.....	100.0	(3)	.....	9,705,251	.....	100.0
IMPORTS								
Group—Value per pound:								
1....$ 0.50 to $ 0.99	4	23.5	10.5	16,466	(1)	13,269	.8	.4
2.... 1.00 to 1.99	4	23.5	10.5	4,190	(1)	7,767	.5	.2
3.... 2.00 to 2.99	1	5.9	2.6	5	(1)	13	(1)	(1)
4.... 3.00 to 3.99	1	5.9	2.6	782	(1)	2,840	.2	.1
5.... 4.00 to 4.99	.....	.....	.....	.....	.....	.....	.....	.....
6.... 5.00 to 9.99	1	5.9	2.6	4	(1)	32	(1)	(1)
7.... 10.00 to 24.99	3	17.6	7.9	1,304	(1)	25,009	1.5	.8
8.... 25.00 and over	1	5.9	2.6	18	(1)	621	(1)	(1)
Total valued $0.50 or over	15	88.2	39.3	22,769	(1)	49,551	3.0	1.5
Total air-cargo potentials [2]	17	100.0	57.9	185,273,239	100.0	1,695,955	100.0	52.5
Total imports from Costa Rica	38	.....	100.0	(3)	.....	3,229,390	.....	100.0

[1] Less than 0.05 percent.
[2] Includes in addition to commodities valued $0.50 per pound and over, those commodities valued less than $0.50 per pound (selected because of perishability, fragility, or as possessing a style factor). A commodity which appears under more than one category is accounted for only once in arriving at the total.
[3] Not available.

TABLE 6.—*United States Trade With Costa Rica—1939*

[Summary of commodities possessing perishability, fragility or style factor]

Categories	Commodities			Shipping weight		Value		
	Number	Percent of air-cargo potentials [1]	Percent of total trade	Gross pounds	Percent of air-cargo potentials [1]	Dollars	Percent of air-cargo potentials [1]	Percent of total trade
Exports—Value per pound:								
Perishable commodities (category 2):								
Less than $0.50	22	5.6	1.7	4,137,174	62.1	301,169	17.5	3.1
$0.50 or more	8	2.0	.6	25,474	.4	25,052	1.5	.3
Total	30	7.6	2.3	4,162,648	62.5	326,221	19.0	3.4
Fragile commodities (category 3):								
Less than $0.50	25	6.3	1.9	1,464,739	22.0	104,742	6.1	1.1
$0.50 or more	61	15.5	4.7	73,059	1.1	232,819	13.5	2.4
Total	86	21.8	6.6	1,537,798	23.1	337,561	19.6	3.5
Commodities possessing style factor (category 4):								
Less than $0.50	2	.5	.2	11,158	.2	3,121	.2	(2)
$0.50 or more	20	5.1	1.5	27,392	.4	39,595	2.3	.4
Total	22	5.6	1.7	38,550	.6	42,716	2.5	.4
Imports—Value per pound:								
Perishable commodities (category 2):								
Less than $0.50	2	11.7	5.3	185,254,611	100.0	1,646,404	97.1	51.0
$0.50 or more	.....	.....	.....	.....	.....	.....	.....	.....
Total	2	11.7	5.3	185,254,611	100.0	1,646,404	97.1	51.0
Fragile commodities (category 3):								
Less than $0.50	.....	.....	.....	.....	.....	.....	.....	.....
$0.50 or more	3	17.6	7.9	28	(2)	722	(2)	(2)
Total	3	17.6	7.9	28	(2)	722	(2)	(2)
Commodities possessing style factor (category 4):								
Less than $0.50	.....	.....	.....	.....	.....	.....	.....	.....
$0.50 or more	2	11.7	5.3	33	(2)	413	(2)	(2)
Total	2	11.7	5.3	33	(2)	413	(2)	(2)

[1] See table 5 for figures on total air-cargo potentials.
[2] Less than 0.05 percent.

Digitized by Google

Since the largest volumes of air potential imports are among the lower-valued groups of items, reductions in present air rates will be a large factor in determining the extent to which a greater balance can be brought about in the future.

With aviation overcoming the difficulties of other methods of transport, Costa Rica's strategic position between the Canal Zone and the United States should stimulate interest in air transport between these two countries.

Data Included in Tables

The accompanying tables give details of the air-cargo potentials itemized and grouped for convenience of reference. Table 5 summarizes, by value groups, items valued at $0.50 and more a pound considered to be air-cargo potentials. Table 6 lists perishables, fragile commodities and those possessing a style factor. These categories have no lower limit as to value per pound. Tables 7 through 10 contain itemized lists of the commodities summarized in tables 5 and 6 according to weight, value per pound, and density.

TABLE 7.—*United States Trade With Costa Rica—1939*

[Group 1—commodities valued from $0.50 to $0.99 per pound]

Class No.	Commodity	Shipping weight (Gross pounds)	Value	Value per pound	Density
	EXPORTS				
0010	Cattle for breeding	13,884	$7,050	$0.51	(1)
0012	Other cattle	584	300	.51	(1)
0016	Sheep	600	320	.53	(1)
0099	Other edible animal products[2]	5,267	2,739	.52	(1)
0300	Leather, cattle, side, grain, black	15,203	11,547	.76	av. 18
0302	Cattle, side, finished splits	19,620	10,125	.52	av. 21
0305	Calf and kip, other	31,993	21,212	.66	av. 18
0307	Sheep and lamb	18,121	11,388	.63	av. 21
0310	Horse and colt	2,316	1,858	.80	av. 21
0321	Lining leather, sheep and lamb	6,906	4,992	.72	av. 31
0323	Other lining leather	2,590	1,823	.70	av. 31
0600	Leather welting	76	47	.62	av. 17
0648	Infants' and children's boots and shoes	45	39	.87	av. 9
0689	Women's and children's handbags, pocketbooks, and purses, materials other than leather	14,771	9,217	.62	5–9
0692	Card cases, change purses, wallets, and similar articles of leather	198	151	.76	9
0695	Luggage and related articles	447	229	.51	7
0697	Belts to be worn on the person	9,189	7,994	.87	8
0699	Other leather manufactures	1,164	1,036	.89	(1)
2036	Rubber soles	7,150	4,305	.60	(1)
2042	Druggist rubber sundries, other than water bottles and fountain syringes	5,249	4,462	.85	13
2043	Clothing of rubber or of rubberized cloth	7,150	4,277	.60	15
2046	Rubber toys and balls	3,567	2,604	.73	18
2064	Casings and tubes, other than tires and inner tubes	4,182	3,414	.82	(1)
2085	Fan belts for automobiles	622	383	.62	37–49
2086	Rubber and balata belting	3,610	2,061	.57	av. 35
2279	Essential or distilled oils, natural oils	4,162	2,193	.53	21–42
2467	Flower seeds	1,431	765	.53	av. 27
2599	Nursery or greenhouse stock, other than flowers	219	175	.80	av. 16
2602	Burley tobacco	10,822	5,729	.53	17–24
2622	Cigarettes	182,713	120,623	.66	av. 22
3015	Cotton sewing thread	5,884	4,145	.70	21–34
3025	Cotton duck, unbleached (gray), ounce duck	4,828	2,750	.57	24–40
3074	Combed and fine carded goods, n.e.s., other than voiles, organdies, lawns, batiste, piques, marquisettes	33,652	19,144	.57	10–18
3093	Hosiery, women's, knit	2,011	1,763	.88	av. 18
3095	Hosiery, men's, knit	9,992	7,994	.80	av. 15
3096	Underwear, men's and boys', cotton, knit	14,266	10,614	.74	av. 12
3099.1	Men's and boys' sweaters, jersey pullovers, and sweat shirts, cotton knit	340	290	.85	av. 7
3099.5	Women's and children's sweaters, shawls, and mufflers, cotton, knit	200	141	.71	av. 7
3114	Overalls, breeches, pants, aprons, and men's work clothing, n.e.s., cotton	1,552	967	.62	25
3115	Nightwear, men's, cotton	227	193	.85	av. 7
3117.1	Work shirts, cotton	81	73	.90	av. 10
3140	Cotton woven belting for machinery	145	96	.66	av. 37
3160	Cotton braids, trimmings, binding, lacings, tape-labels and webbing	2,534	2,180	.86	av. 15
3161	Other narrow fabrics[2]	925	509	.55	av. 15
3173	Cotton quilts, comfortables and quilted bedpads	275	174	.63	av. 13
3175	Cotton bedspreads, candlewick, chenille, and tufted	1,929	1,442	.75	av. 14
3178	Cotton bed sheets and pillow cases	11,329	6,336	.56	20–32
3181	Cotton curtains and draperies	213	149	.70	av. 8
3189	Other house furnishings	1,539	862	.56	(1)
3399	Flax, hemp, and ramie manufactures	1,110	1,066	.96	(1)
3642	Wool cloth and dress goods	2,751	1,758	.64	12–16
3662	Carpets and rugs of wool	375	222	.59	av. 13
3665	Wool felts	2,289	1,136	.50	av. 18
3699	Hair manufactures, other than cattle, oxbody, hog, horse, and hair felt	188	96	.51	(1)
3849.9	Piece goods, etc., remnants and mill ends	94	47	.50	av. 31
3858.5	Braids, fringes, and narrow trimmings	37	33	.89	av. 12
3914.2	Book cloth (all types) starch filled	156	121	.78	29–33
3915	Pyroxylin coated or impregnated fabrics	4,924	2,762	.56	av. 34
3918	Waterproof outer garments	1,104	1,058	.96	av. 12
3942	Harvest hats, of straw, palm leaf, etc.	28	14	.50	3–10
4305	Stoppers (include shell corks)	51	36	.71	av. 11
5291	Chemical glassware	2,888	2,554	.88	6–9
5474	Carbon or graphite brushes and stock	2,510	1,255	.50	av. 29
6115	Table cutlery, incl. forks	927	795	.86	av. 30
6156	Crosscut, hand, back and other saws[2]	4,473	2,684	.60	21–30
6157.1	Augers, bits, gimlet bits, and counter sinks; woodworking	1,920	1,776	.92	40–100
6169	Hand-operated pipe stocks and dies, die stocks, dies and bushings	681	497	.73	53–120
6170	Hand-operated pipe cutters and other metal cutting tools[2]	1,836	1,028	.56	53–120
6172	Slip joint pliers	22	18	.82	50–90
6178.9	Other handtools and parts	34,934	34,585	.99	28–141
6230	Tungsten metal, wire, shapes and alloys	14	13	.93	av. 49
6545	Nickel monel metal, and alloys in ingots, bars, rods, sheets, plates, etc.	175	101	.58	37–115
6958	Silver plated ware, knives, forks, and steak sets	1,958	1,488	.76	17–43
6959	Silver plated ware, other	2,715	2,199	.81	17–43
7000	Generators, direct current	4,921	2,608	.53	av. 51
7019	Capacitors ½ kilovolt ampere and larger	1	56	.56	120–160
7048	Starting and controlling equipment for industrial motors and parts	780	390	.50	(1)
7049	Starting and controlling equipment for electric railway and vehicle motors and parts	1,765	953	.54	(1)
7060	Flashlight cases	10,246	8,534	.83	av. 10
7065	Other electric lamps	956	494	.52	4–12
7089	Bells, buzzers, annunciators and alarms	99	92	.93	av. 24
7095	Sockets, outlets, fuse blocks, lighting switches and parts	5,645	4,629	.82	av. 20
7443	Metal grinding machines and parts other than internal grinding, tool grinding, cutter grinding, and universal grinding machines	2,400	1,824	.76	31–49
7455	Power-driven metal working machinery and parts, other than sheet and plate metal working machines, forging, rolling mill, molding, blast cleaning and tumbling machines and parts	3,277	1,737	.53	18–49

(1) Not available.
(2) Not specially provided for.

Digitized by Google

TABLE 7.—*United States Trade With Costa Rica—1939*—Continued

[Group 1—commodities valued from $0.50 to $0.99 per pound]

Class No.	Commodity	Shipping weight (Gross pounds)	Value	Value per pound	Density
	EXPORTS—Continued				
7458 ...	Pneumatic portable tools, portable hand-or-foot operated metal-working machines and parts ...	14,097	8,317	.59	15–69
7590 ...	Cigarette and cigar making and other tobacco machinery and parts	9,542	5,248	.55	(1)
7691 ...	Ball bearings and parts, except balls	710	554	.78	50–120
7692 ...	Roller bearings and parts, except roller	106	82	.77	50–120
7763 ...	Duplicating machines, parts, and supplies for	4,982	2,840	.57	13–20
7767 ...	Cash register parts	765	750	.98	av. 23
7795 ...	Printing and typesetting machinery, parts and accessories, other than printing presses	5,845	3,799	.65	23–55
7802 ...	Dairy equipment and parts, for farm use, other than cream separators valued less than $50	1,214	777	.64	10–22
7954 ...	Motorcycle parts and accessories (except tires)	710	447	.63	(1)
7970 ...	Railway signals, attachments and parts	9,268	5,283	.57	(1)
8028 ...	Rubber compounding agents of coal-tar products	1,859	1,510	.81	32–54
8059 ...	Coal-tar colors, dyes, stains, and color lakes..	12,427	6,571	.53	18–58
8120 ...	Biologics for animal and veterinary use	5,030	4,426	.88	(1)
8130 ...	Medical and reagent chemicals	22,007	16,285	.74	av. 23
8149 ...	Corn and foot remedies..	286	226	.79	av. 14
8151 ...	Salves and ointments for burns, cuts, skin diseases, insect bites, inflammation, etc.	4,146	2,778	.67	av. 33
8180 ...	Other proprietary medicinal preparations	16,767	9,725	.58	30–45
8296 ...	Pectin	137	97	.71	28–52
8734 ...	Dental creams	26,649	18,275	.69	av. 31
8735 ...	Other dentrifices	256	218	.85	av. 23
8742 ...	Face and compact powder	1,140	661	.58	19–50
8750 ...	Cold creams	251	193	.77	36–40
8751 ...	Vanishing creams	110	99	.90	av. 30
8757 ...	Cosmetics, other than rouges and lipsticks ...	541	400	.74	av. 30
8766 ...	Perfumery and toilet waters	1,653	1,603	.97	av. 25
9003 ...	Cameras, other than motion picture, boxtype (set focus)	1,503	894	.59	17–40
9011 ...	Reproducing, motion picture sound equipment..	6,491	6,102	.94	av. 11
9126.9..	Packs of sheets of "sensitized" films, not exposed, not X-ray	223	198	.89	23–41
9129 ...	Photographic paper	2,357	1,800	.76	av. 20
9140 ...	Other photographic apparatus and supplies	1,535	1,182	.77	av. 27
9155 ...	Dental equipment and supplies, other than gold and precious metal alloys for dental purposes	4,019	2,532	.63	8–62
9297 ...	Musical instrument parts and accessories[2]	3,139	1,695	.54	8–18
9319 ...	Penholders and parts, not fountain and stylographic	511	272	.53	14
9392 ...	Carbon paper	3,946	2,648	.67	36
9422 ...	Fishing tackle and parts..	325	234	.72	av. 30
9434 ...	Foot, basket, base, tennis, and other balls	137	127	.93	9–30
9490 ...	Shotshells	2,600	2,157	.83	76
9571 ...	Clocks, 1-day alarm	904	770	.85	26–40
9572 ...	Clocks, mantel, novelty, and wall clocks	199	148	.74	26–40
9591 ...	Time recording devices and parts	1,754	1,368	.78	(1)
9792 ...	Lanterns, wick	4,549	2,493	.55	9–17
9793 ...	Gasoline pressure lamps, lanterns and parts	4,005	2.243	.56	3–22
9794 ...	Lamps, other than electric, lanterns, gasoline pressure lamps	1,156	959	.83	3–22
9819 ...	Manufactures of cellulose, acetate[2]	43	29	.68	(1)
9820 ...	Manufactures of all other compounds of cellulose[2]	205	154	.75	(1)
9830 ...	Plates and cuts, electrotype, half tone, lithographic or engraved ...	50	25	.50	12–34
9831 ...	Umbrellas and parasols ..	2,180	1,963	.90	av. 26
9870 ...	Coin-operated phonographs	2,688	1,566	.58	17–24
	Total	746,152	$504,262		
	IMPORTS				
0032.9..	Canned meats[2] and prepared or preserved meats[2] (incl. liver paste)	20	$12	$0.60	37–54
2210.45.	Drugs, herbs, leaves, roots, etc.: Ipecac	14,281	12,172	.85	80
4280.99.	Manufactures of wood or bark[2]	15	10	.67	(1)
9950.0..	Household furniture, wearing apparel, tools of trade, books and professional and personal effects not merchandise	2,150	1,075	.50	(1)
	Total	16,466	$13,269		

[Group 2—commodities valued from $1.00 to $1.99 per pound]

Class No.	Commodity	Shipping weight (Gross pounds)	Value	Value per pound	Density
	EXPORTS				
0094 ...	Meat and bouillon cubes..	211	$287	$1.36	34–57
0308 ...	Leather, goat and kid (glazed kid), black ...	6,103	8,661	1.42	av. 21
0309 ...	Leather, goat and kid (glazed kid), other ...	20,921	24,372	1.16	av. 21
0312 ...	Patent leather, cattle	19,426	21,013	1.08	av. 10
0327 ...	Soles, outer	108	147	1.36	(1)
0336 ...	Sheep and lamb glove and garment leather	3,149	3,393	1.08	av. 19
0353 ...	Upholstery and automobile leather	1,842	2,213	1.20	av. 24
0645 ...	Men's boots and shoes ...	572	834	1.46	av. 14
0650 ...	Slippers for housewear, all leather	173	224	1.29	av. 9
0680 ...	Leather belting, new ...	4,262	5,945	1.39	av. 37
0688 ...	Leather women's and children's handbags, pocketbooks, and purses	493	820	1.66	5–9
0698.9..	Leather wearing apparel..	1,151	1,784	1.55	av. 8
0929 ...	Feathers, dressed, and manufactures of	1,425	1,539	1.08	6–29
2058 ...	Combs, hard rubber, finished	143	246	1.72	24
3094 ...	Hosiery, children's, cotton, knit	8,579	11,340	1.32	av. 13
3097 ...	Underwear, women's and children's, cotton, knit .	1,638	1,765	1.08	av. 11
3098 ...	Nightwear, women's and children's, cotton, knit .	24	35	1.46	av. 7
3099.9..	Other knit outerwear[2] ...	1,682	1,785	1.06	7–22
3116 ...	Underwear, men's athletic, not knit	1,275	1,391	1.09	av. 13
3117.2..	Other men's and boy's shirts (except knit) ...	8,683	14,030	1.62	av. 10
3122 ...	Women's dresses and ensembles, cotton, knit ..	738	1,160	1.57	av. 11
3124 ...	Women's and children's underwear and nightwear, not knit	366	476	1.30	av. 13
3127 ...	Children's outerwear, not knit	308	496	1.61	6–22
3129 ...	Other women's and children's apparel of woven fabrics[2]	766	935	1.22	6–22
3679 ...	Other knit goods, wool ...	1,091	1,156	1.06	av. 10
3680 ...	Men's and boys' overcoats, suits and pants, wool ..	151	278	1.84	av. 17
3689 ...	Other wool or mohair manufactures	1,722	1,825	1.06	(1)
3725 ...	Broad silks	644	1,072	1.66	av. 22
3845 ...	Piece goods, wholly or chiefly rayon and other synthetic fibers, pile (velvets, etc.)	178	210	1.18	av. 21
3849.1..	Piece goods, wholly or chiefly rayon or other synthetic fibers, other woven fabric	42,405	46,387	1.09	av. 31
3854 ...	Hosiery, women's and children's rayon	206	239	1.16	av. 13
3856 ...	Hosiery, men's socks, rayon	5,426	7,073	1.30	av. 13
3857.1..	Knit underwear, rayon ..	990	1,534	1.55	av. 10
3857.2..	Woven underwear, rayon	544	1,050	1.93	av. 12
3859 ...	Other synthetic textile manufactures	503	593	1.18	(1)
3913 ...	Window shade cloth	1,212	1,649	1.36	av. 52
3944 ...	Sewed hats and hat bodies of straw, palm leaf, etc., other than harvest hats	2,147	2,178	1.01	3–10
3945 ...	Woven hats and hat bodies of straw, etc., other than harvest hats	673	801	1.19	3–10
3958 ...	Hats, caps, and berets of woven fabric	1,556	2,781	1.79	10–15
3963 ...	Artificial or ornamental flowers, fruits, vegetables, etc.	66	70	1.06	3–6
3994 ...	Garters, arm bands, suspenders, and braces ...	725	761	1.05	av. 17

Digitized by Google

TABLE 7.—*United States Trade With Costa Rica—1939*—Continued

[Group 2—commodities valued from $1.00 to $1.99 per pound]

Class	Commodity	Shipping weight (Gross pounds)	Value	Value per pound	Density
	EXPORTS—Continued				
4302 ...	Disks, washers, and wafers, of cork	143	157	1.10	(1)
5217 ...	Laminated glass and manufactures	359	438	1.22	64–80
5513 ...	Mica, manufactured and manufactures, other than ground or pulverized	9	11	1.22	av. 64
6112 ...	Razors, safety	376	666	1.77	av. 38
6116 ...	Butchers and kitchen knives, forks, cleavers, and steels	797	1,031	1.29	av. 50
6154 ...	Hacksaw blades	2,730	3,868	1.42	av. 135
6167 ...	Drills, reamers, and counter sinks, metal cutting	1,480	2,560	1.73	30–65
6173 ...	Pliers, other than slip joint, pincers, nippers and splicing clamps	559	912	1.63	50–90
6195 ...	Automatic scales	9,042	9,957	1.10	18–34
6197 ...	Precision scales, balances, and weights for laboratory use	47	87	1.85	av. 18
6630 ...	Nickel chrome electric resistance wire	1,836	2,537	1.38	av. 50
6635 ...	Quicksilver or mercury	899	1,118	1.24	172–800
7038 ...	Electrical testing apparatus and parts, other than indicating and recording instruments	584	590	1.01	(1)
7075.9..	Therapeutic apparatus and parts, other than X-ray	621	589	1.11	(1)
7079 ...	Radio receiving set apparatus	4,124	6,104	1.48	11–36
7081 ...	Receiving set accessories	425	527	1.24	(1)
7082 ...	Telegraph apparatus and parts	412	569	1.38	av. 24
7087 ...	Telephone equipment and parts, other than instruments	9,244	9,521	1.03	10–60
7099.1..	Razors, electric	86	95	1.10	av. 16
7159 ...	Engine accessories and parts, internal combustion	42,089	42,510	1.01	av. 45
7485 ...	Metal working machine tools and parts, other than milling cutters, machine operated, threading dies and taps and similar machine-operated metal cutting tools	1,207	1,593	1.32	15–69
7553 ...	Sewing machine parts	1,926	3,389	1.76	av. 39
7644 ...	Bottling, bottle-washing, and bottle-labeling machinery and parts	946	1,059	1.12	8–27
7761 ...	Parts for accounting and calculating machines	742	1,039	1.40	av. 23
7775 ...	Typewriter parts	243	282	1.16	av. 22
7779 ...	Other office appliances and parts	2,165	2,447	1.13	(1)
8119 ...	Vitamine and vitasterols	444	723	1.63	(1)
8127 ...	Tablets, pills, capsules, powders, ointments, and similar manufactures	25,892	26,669	1.03	av. 25
8155 ...	Asthma, catarrh, and hay fever preparations, incl. inhalants	774	813	1.05	30–45
8167 ...	Headache, neuralgia, and pain remedies	5,056	5,764	1.14	30–45
8264 ...	Pyroxylin sheets, rods, or tubes and other unfinished forms	17	18	1.06	10–68
8755 ...	Rouges	945	1,144	1.21	av. 30
9002.3..	Cameras, motion picture substandard gage (less than 35 mm.), aerial, studio, photo engraving, coin operated and similar types of cameras for professional, scientific or commercial uses	58	99	1.71	17–40
9005 ...	Other than motion picture cameras	36	70	1.94	av. 40
9008.1..	Motion picture projectors, substandard gage (less than 35 mm.), silent	690	1,004	1.46	20–28
9008.2..	Motion picture projectors, substandard gage (less than 35 mm.), sound	396	520	1.31	av. 14
9010 ...	Motion picture sound equipment, recording	45	67	1.48	(1)
9123.1..	Motion picture films, positive, features (4000 lin. ft. or over)	2,922	5,719	1.96	av. 40
9123.5..	Motion picture films (less than 4000 lin. ft.)	55	56	1.02	av. 40
9143 ...	Ophthalmic lenses, spectacles, eyeglasses, goggles, lenses,[3] and frames	1,719	2,372	1.38	11–41
9157 ...	Surgical and medical instruments	2,164	2,856	1.32	21
9160 ...	Surveying and engineering instruments	6,244	8,179	1.31	18–33
9190 ...	Other scientific laboratory and professional instruments and apparatus	7,052	7,616	1.08	3–87
9295 ...	Musical instruments, other than string	29	29	1.00	2–27
9395 ...	Typewriter ribbons	1,357	1,999	1.47	47
9421 ...	Fishing reels	26	27	1.04	(1)
9433 ...	Golf balls	72	130	1.81	18–33
9570 ...	Clocks, electric	101	114	1.13	16
9579 ...	Clocks and parts, other than electric, 1-day alarm, mantel, novelty, and wall clocks	177	234	1.32	17–48
9809 ...	Synthetic resin products of plates, rods, tubes, and other unfinished forms	34	41	1.21	(1)
9824 ...	Toilet brushes, other than tooth brushes	406	728	1.79	5–16
9826.9..	Brushes, other than tooth and paint brushes, including industrial brushes	1,213	1,992	1.64	29
	Total	4,190	$7,767		
	IMPORTS				
2559.3..	Grafted or budded plants, cuttings and seedlings of ornamental trees, shrubs, vines, and all nursery or greenhouse stock[3]	2	$3	$1.50	(1)
9620.2..	Original sculptures or statuary	42	75	1.79	(1)
9640.9..	Artistic antiquities, works of art, etc. (except rugs and carpets) produced prior to the year 1830	3	5	1.67	(1)
9800.99.	Pipes and smokers articles	2	2	1.00	(1)
	Total	281,151	$329,605		

[Group 3—commodities valued from $2.00 to $2.99 per pound]

Class	Commodity	Shipping weight (Gross pounds)	Value	Value per pound	Density
	EXPORTS				
0330 ...	Belting leather	17	$36	$2.12	av. 43
0693 ...	Card cases, change purses, wallets, and similar articles of materials other than leather	14	34	2.43	av. 9
0758 ...	Fur waste, fur pieces, and damaged fur skins	87	199	2.29	6–17
0759 ...	Other fur manufactures	236	599	2.54	4–6
3113 ...	Men's and boys' jackets and windbreakers of corduroy, moleskin, leatherette, and sheep-lined	19	39	2.05	av. 25
3185 ...	Cotton laces, embroideries, and lace window curtains	62	139	2.24	av. 8
3675 ...	Knit bathing suits, wool	1,034	2,420	2.34	av. 10
3681 ...	Women's and children's wool clothing	1,313	2,955	2.25	av. 16
3757 ...	Hosiery, men's socks, silk	683	1,514	2.22	av. 12
3852 ...	Dresses, skirts, blouses and other outerwear not knit or crocheted, rayon	914	2,456	2.69	av. 10
3853.2..	Other knit outerwear, rayon	160	390	2.43	8–12
3952 ...	Women's and girls' fur-felt hats	225	658	2.92	3–6
3953 ...	Wool-felt hat	438	1,003	2.29	3–10
6179 ...	Padlocks of iron, steel, brass, and bronze	2,301	6,390	2.78	54–96
6181 ...	Cabinet and other locks of iron, steel, brass and bronze	113	280	2.50	av. 21
7011 ...	Self-contained lighting outfits	3,009	6,019	2.00	(1)
7076 ...	Transmitting sets, tubes and parts	5,054	10,765	2.13	9–36
7482 ...	Milling cutters, machine operated, threading dies and taps, and similar machine-operated metal cutting tools	278	650	2.34	15–69
8122 ...	Vaccines for human use	509	1,462	2.87	(1)
8123 ...	Glandular products, organotherapeutics, enzymes, ferments, and culture media	3,895	8,569	2.20	(1)
8157 ...	Malaria, chill and fever remedies	228	495	2.17	30–45
8629 ...	Blasting caps	2,478	6,512	2.63	av. 36
8756 ...	Lipsticks	1,808	3,616	2.00	av. 30

Digitized by Google

TABLE 7.—*United States Trade With Costa Rica—1939*—Continued

[Group 3—commodities valued from $2.00 to $2.99 per pound]

Class No.	Commodity	Shipping weight (Gross pounds)	Value	Value per pound	Density
	EXPORTS—Continued				
9126.1..	Sensitized films, not exposed, pack of X-ray sheets	136	325	2.39	av. 23
9142 ..	Ophthalmic lenses	18	44	2.44	9–29
9158 ...	Surgical appliances, artificial limbs, crutches, trusses, etc.	1,550	3,409	2.20	4–60
9420 ...	Fishing rods	49	135	2.76	14–23
9436 ...	Golf clubs	28	59	2.11	(1)
9626 ...	Articles, other than jewelry, of metals, other than solid gold or platinum	188	521	2.77	(1)
9628 ...	Women's jewelry of metals, other than solid gold or platinum	169	494	2.92	(1)
9825 ...	Paint brushes, except industrial	952	5,213	2.67	25
9828 ...	Tobacco pipes (of all materials)	113	289	2.56	13
	Total	29,078	$67,692		
	IMPORTS				
9022.5..	Motion picture film shorts, other than news reels (less than 4,000 lin. ft.)	5	$13	$2.60	av. 40
	Total	5	$13		

[Group 4—commodities valued from $3.00 to $3.99 per pound]

Class No.	Commodity	Shipping weight (Gross pounds)	Value	Value per pound	Density
	EXPORTS				
2280 ...	Blended, compounded, or mixed perfume flavor oils	49	$188	$3.84	av. 24
3755 ...	Hosiery, women's full fashioned, silk	4,527	15,936	3.52	av. 11
3759 ...	Wearing apparel, other than dresses, skirts, blouses, and hosiery, silk	126	419	3.33	8–16
3853.1..	Knit or crocheted dresses and ensembles	262	984	3.76	av. 10
3857.7..	Sleeping and lounging garments, knit or woven	146	453	3.10	8–14
6118 ...	Machine knives	21	74	3.52	av. 14
6168 ...	Hand operated screw plates, bolt dies, taps, and tap wrenches	124	409	3.31	53–120
7947 ...	Aircraft engine parts and accessories	2,688	8,305	3.09	4–40
8121 ...	Serums and antitoxins for human use	753	2,750	3.65	(1)
9001 ...	Cameras, motion picture substandard gage (less than 35 mm.)	386	1,174	3.04	av. 36
9112 ...	Stereopticons, magic lanterns, and other projection apparatus	413	1,438	3.48	(1)
9123.9..	Motion picture films, positive (less than 4,000 lin. ft.), other than features and newsreels	463	1,559	3.37	av. 40
9149 ...	Optical goods, other than ophthalmic lenses, spectacles, eyeglasses, goggles, lenses, and frames	358	1,153	3.22	(1)
9150 ...	Dental instruments	15	55	3.67	13–20
9310 ...	Fountain and stylographic pens of plastic materials	67	247	3.69	(1)
9580 ...	Watches without jewels	89	303	3.40	av. 46
9635 ...	Jewelry findings, parts, and materials	74	267	3.62	(1)
9791 ...	Lamps and illuminating devices, except electric, incandescent, mantels	51	176	3.45	9
9822 ...	Toothbrushes	1,205	3,791	3.15	14
	Total	11,817	$39,681		
	IMPORTS				
0295.0..	Reptile skins, raw	782	$2,840	$3.63	(1)
	Total	782	$2,840		

[Group 5—commodities valued from $4.00 to $4.99 per pound]

Class No.	Commodity	Shipping weight (Gross pounds)	Value	Value per pound	Density
	EXPORTS				
3799 ...	Silk manufactures, other than dresses, skirts, blouses, and hosiery	42	$185	$4.40	av. 8
3921 ...	Corsets, brassieres, and girdles	1,317	5,956	4.52	av. 12
3928 ...	Neckties, cravats, mufflers and scarfs of all fibers	1,165	4,913	4.22	av. 22
6955 ...	Sterling and other solid silverware, knives, forks, and steak sets	33	160	4.85	17–43
6956 ...	Sterling and other solid silverware	12	58	4.85	17–43
7080 ...	Loud speakers for radios	1	4	4.00	av. 13
9247 ...	Brass wind instruments	12	50	4.17	6–14
9470 ...	Revolvers and pistols	1,216	5,239	4.38	av. 42
9581 ...	Watches without jewels	417	1,711	4.10	av. 46
	Total	4,215	$18,276		

[Group 6—commodities valued from $5.00 to $9.99 per pound]

Class No.	Commodity	Shipping weight (Gross pounds)	Value	Value per pound	Density
	EXPORTS				
0753 ...	Fur wearing apparel	183	$1,409	$7.70	4–6
3091.2..	Dress and all other knit goods, cotton	14	88	6.29	av. 11
3742 ...	Silk dresses, skirts and blouses	831	5,841	7.03	av. 10
3754 ...	Hosiery, women's and children's seamless, silk	318	2,086	6.56	av. 11
3951 ...	Men's and boys' fur-felt hats	430	2,425	5.64	3–10
6189 ...	Sewing machine needles	78	667	8.55	av. 37
6190 ...	Other needles	14	109	7.79	av. 37
7035 ...	Watt-hour and other measuring meters	649	4,184	6.45	37–64
7075.5..	X-ray apparatus and parts, other than tubes	1,172	9,255	7.90	14–60
7083 ...	Telephone instruments	79	667	8.44	av. 50
7760 ...	Accounting and calculating machines, used and rebuilt	80	492	6.15	13–28
9006 ...	Parts of cameras, except lenses	1	7	7.00	(1)
9007 ...	Motion picture projectors, standard gage (35 mm.)	272	1,589	5.84	av. 11
9121.1..	Exposed motion picture films, negative, features (4,000 lin. ft. or over)	30	233	7.77	av. 40
9232 ...	Organs, other than pipe	351	2,196	6.26	9
9248 ...	Wood-wind instruments	10	95	9.50	6–27
9312 ...	Parts of fountain and stylographic pens	31	239	7.71	8–42
9621 ...	Men's jewelry of other metals	177	961	5.43	(1)
9623 ...	Women's jewelry of metal other than solid gold or platinum	221	1,598	7.23	(1)
	Total	4,941	$34,141		
	IMPORTS				
9919.3..	Articles, the growth, produce or manufacture of the U. S. returned: Photographic dry plates and film of American manufacture (except motion picture films for commercial purposes) exposed abroad whether developed or not	4	$32	$8.00	(1)
	Total	4	$32		

[Group 7—commodities valued from $10 to $24.99 per pound]

Class No.	Commodity	Shipping weight (Gross pounds)	Value	Value per pound	Density
	EXPORTS				
6465 ...	Hinges and butts of brass or bronze	948	$10,102	$10.66	48–90
6997 ...	Gold manufactures[2]	80	1,380	17.25	(1)
7027.2..	Rotating converters, 300 kilowatts and larger	55	580	10.55	av. 51
7036 ...	Electrical indicating instruments	97	1,100	11.34	5–17
7037 ...	Electrical recording instruments	16	328	20.50	25
7073.5..	Domestic electric utensils	113	1,376	12.18	6–11
7075.1..	X-ray tubes	31	544	17.55	av. 2
7077 ...	Receiving sets	3,468	60,634	17.48	7–29
9121.9..	Exposed motion picture films, negative (less than 4,000 lin. ft.) not features	10	135	13.50	av. 40
9147 ...	Optical lenses, not fitted to instruments	2	38	19.00	av. 45
9309 ...	Fountain and stylographic pens of plastic materials	181	4,029	22.26	15
	Total	5,001	$80,246		

Digitized by Google

TABLE 7.—*United States Trade With Costa Rica—1939*—Continued

[Group 7—commodities valued from $10 to $24.99 per pound]

Class No.	Commodity	Shipping weight (Gross pounds)	Value	Value per pound	Density
	IMPORTS				
9001.3..	Cameras, all other than box type	8	$98	$12.25	17–40
9022.1..	Motion picture film, features (4,000 lin. ft. or over)	28	400	14.29	(1)
9503.6..	Stamps, foreign postage or revenue and foreign govt. stamped envelopes or post cards	1,268	24,511	19.33	8–24
	Total	1,304	$25,009		

[Group 8—commodities valued from $25 and up per pound]

	EXPORTS				
6125 ...	Lavatories, sinks and other plumbing fixtures	229	$9,887	$43.17	(1)
7027.1..	Rotating converters, under 300 kilowatts	12	539	44.92	av. 51
7028 ...	Complete battery chargers, nonrotating	13	658	50.62	15–26
7030 ...	Feeder voltage regulators	1	53	53.00	100–140
7056 ...	Portable electric tools	21	3,337	158.90	24–140
7066 ...	Searchlights and airport beacons	3	226	75.33	8–15
7067 ...	Floodlights	6	393	65.50	(1)
7069.1..	Electric domestic vacuum cleaners	1	33	33.00	8–33
7142 ...	Stationary and portable engines, Diesel and semi-Diesel	8	107,570	13,446.00	av. 95
7311 ...	Mining and quarrying machinery	2	880	440.00	16–157
7442 ...	Tool grinding, cutter grinding, and universal grinding machines	1	435	435.00	31–49
7457 ...	Pneumatic portable tools	41	5,788	141.17	24–140
7471 ...	Chucks for machine tools	5	205	41.00	42–78
7552 ...	Sewing machines, for factory or industrial use	109	7,680	70.46	5–37
7752 ...	Listing-adding-bookkeeping machines	5	2,204	440.80	16–24
7753 ...	Typewriter-bookkeeping-billing machines	5	5,463	1,092.60	15–20
7756 ...	Listing adding machines	234	10,018	42.81	16–34
7757 ...	Calculating machines	162	12,402	76.56	16–23
7764 ...	Cash registers, new	158	13,395	84.78	17–31
7766 ...	Cash registers, used and rebuilt	3	1,342	447.33	17–31
7770 ...	Typewriters, standard, new	204	20,136	98.71	av. 19
7772 ...	Typewriters, portable, new	203	8,113	39.97	av. 24
7774.1..	Typewriters, rebuilt	9	626	69.56	av. 20
7774.9..	Typewriters, other used	1	50	50.00	av. 20
7790 ...	Typesetting machines	1	7,200	7,200.00	av. 23
7946 ...	Engines, aircraft	118	26,440	224.07	10–40
7958 ...	Diesel and semi-Diesel	2	5,992	2,996.00	27–47
7959 ...	Other internal combustion marine engines	4	1,115	278.75	27–30
9154 ...	Dental gold and precious metal alloys for dental purposes	25	1,169	46.76	(1)
9620 ...	Jewelry of solid gold or platinum	6	520	86.67	(1)
	Total	1,592	$253,869		
	IMPORTS				
2559.2..	Orchid plants	18	$621	$34.50	14
	Total	18	$621		

(1) Not available.
(2) Not elsewhere specified.
(3) Not specially provided for.

TABLE 8.—*United States Trade With Costa Rica—1939*

[Perishable commodities—category 2]

	EXPORTS				
0010 ...	Cattle for breeding	13,884	$ 7,050	$0.51	(1)
0012 ...	Other cattle	584	300	.51	(1)
0016 ...	Sheep	600	320	.53	(1)
0019 ...	Poultry, live	689	289	.42	(1)
0020 ...	Beef and veal, fresh or frozen	318	125	.39	25–50
0027 ...	Pork, fresh or frozen	300	61	.20	25–36
0034 ...	Mutton and lamb	1,072	269	.25	25–50
0040 ...	Poultry and game, fresh	667	157	.24	(1)
0053 ...	Lard	3,673,975	259,799	.07	av. 36
0065 ...	Butter	4,457	1,236	.28	37
0071 ...	Fish, other than fresh	370	60	.16	38–52
0072 ...	Oysters, fresh, in the shell, shucked, frozen or in ice	6,201	1,045	.17	37
0909 ...	Live animals, other than horses, mules, asses and burros	9,768	3,028	.31	(1)

TABLE 8.—*United States Trade With Costa Rica—1939*—Continued

[Perishable commodities—category 2]

Class No.	Commodity	Shipping weight (Gross pounds)	Value	Value per pound	Density
	EXPORTS—Continued				
1209 ...	Green peas	4,662	160	.03	15–23
1224 ...	Other fresh vegetables	28,600	572	.02	14–48
1256 ...	Yeast	160,563	18,787	.12	22
1309 ...	Cherries	2,753	378	.14	23–42
1313 ...	Berries	216	23	.11	14–34
1314.5..	Melons, other than watermelons	1,266	68	.05	31–40
1315 ...	Grapes	167,504	10,549	.06	24–40
1316 ...	Pears	60,465	3,580	.06	35–39
1317 ...	Peaches	2,891	226	.08	32–37
1318 ...	Prunes and plums	9,031	726	.08	33
1319.1..	Apricots	56	4	.07	33
1319.9..	Other fresh fruits	1,350	27	.02	24–40
2599 ...	Nursery or greenhouse stock, other than flowers and foliage, cut, fresh, and preserved[2]	219	175	.80	av. 16
8120 ...	Biologics for animal and veterinary use	5,030	4,426	.88	(1)
8121 ...	Serums and antitoxins for human use	753	2,750	3.65	(1)
8122 ...	Vaccines for human use	509	1,462	2.87	(1)
8123 ...	Glandular products, organotherapeutics, enzymes, ferments, and culture media	3,895	8,569	2.20	(1)
	Total	4,162,648	$326,221		
	IMPORTS				
0086.2..	Turtles	307,382	$15,184	$0.05	(1)
1301.0..	Bananas, green or ripe	184,947,229	1,631,220	.01	18
	Total	185,254,611	$1,646,404		

[1] Not available.
[2] Also listed as fragile.

TABLE 9.—*United States Trade With Costa Rica—1939*

[Fragile commodities—category 3]

	EXPORTS				
2599 ...	Nursery or greenhouse stock, other than flowers and foliage, cut, fresh and preserved[1]	219	$175	$0.80	av. 16
5212 ...	Plate glass	45,388	5,841	.13	64–80
5215 ...	Cylinder, crown, and sheet glass	2,077	163	.08	45–100
5217 ...	Laminated glass and manufactures	359	438	1.22	64–80
5218 ...	Rolled glass	10,532	776	.07	30–60
5230 ...	Other glass	2,168	477	.22	(2)
5232 ...	Pharmaceutical and proprietary ware, incl. prescription bottles, ampoules and vials	176,133	10,568	.06	11–26
5234 ...	Beverage bottles, incl. soda, beer, and alcoholic beverage bottles	247,700	4,954	.02	22–30
5235 ...	Used glass containers of all types	156,325	6,253	.04	22–30
5236 ...	Other unfilled glass containers	228,875	9,155	.04	22–30
5237 ...	Tumblers, drinking glasses and stemware, plain, cut or engraved	84,300	4,215	.05	12–25
5239 ...	Table glassware,[3] plain, cut or engraved	92,840	4,642	.05	12–30
5255 ...	Lamp chimneys and lantern globes	3,136	439	.14	3–9
5261 ...	Globes and shades for lighting fixtures	8,475	1,017	.12	3–9
5291 ...	Chemical glassware	2,888	2,554	.88	6–9
5292 ...	Glass electric insulators	2,114	297	.14	av. 30
5299 ...	Other glassware	37,250	3,725	.10	(2)
7035 ...	Watt-hour and other measuring meters	649	4,184	6.45	37–64
7036 ...	Electrical indicating instruments	97	1,100	11.34	5–17
7037 ...	Electrical recording instruments	16	328	20.50	25
7038 ...	Other electrical testing apparatus and parts	584	590	1.01	(2)
7063 ...	Electric incandescent lamps for automobiles, flashlights and Christmas trees	31,288	1,396	.04	5–12
7064 ...	Other metal filament lamps	52,017	9,171	.18	5–12
7065 ...	Other electric lamps	956	494	.52	4–12
7067 ...	Flood lights	6	393	65.50	8–15
7075.1..	X-ray tubes	31	544	17.55	av. 2
7075.5..	Other X-ray apparatus and parts	1,172	9,255	7.90	14–60
7075.9..	Other therapeutic apparatus and parts	621	689	1.11	(2)

Digitized by Google

TABLE 9.—*United States Trade With Costa Rica—1939*—Continued

[Fragile commodities—category 3]

Class No.	Commodity	Shipping weight (Gross pounds)	Value	Value per pound	Density
7076 ...	Transmitting sets, tubes, and parts	5,054	10,765	2.13	9–36
7077 ...	Receiving sets	3,468	60,634	17.48	7–29
7078 ...	Radio receiving tubes	17,545	4,036	.23	av. 9
7079 ...	Receiving-set components	4,124	6,104	1.48	11–36
7080 ...	Loud speakers	1	4	4.00	av. 13
7081 ...	Other receiving set accessories	425	527	1.24	(2)
7082 ...	Telegraph apparatus and parts	412	569	1.38	av. 24
7083 ...	Telephone instruments	79	667	8.44	av. 50
7087 ...	Other telephone equipment and parts	9,244	9,521	1.03	10–60
7092 ...	Starting, lighting and ignition equipment	3,877	1,667	.43	(2)
7099.1..	Electric razors	86	95	1.10	av. 16
7741 ...	Gas meter parts	24	8	.33	(2)
7742 ...	Watermeter parts	21	10	.48	(2)
7752 ...	Listing-adding-bookkeeping machines	5	2,204	440.80	16–24
7753 ...	Typewriter - bookkeeping - billing machines	5	5,463	1,092.60	15–20
7756 ...	Listing adding machines	234	10,018	42.81	16–34
7757 ...	Calculating machines	162	12,402	76.56	16–23
7764 ...	Cash registers, new	158	13,395	84.78	17–31
7766 ...	Cash registers, new and rebuilt	3	1,342	447.33	17–31
7770 ...	Typewriters, standard, new	204	20,136	98.71	av. 19
7772 ...	Typewriters, portable, new	203	8,113	39.97	av. 24
7774 ...	Typewriters, rebuilt	9	626	69.56	av. 20
7774.9..	Typewriters, other, used	1	50	50.00	av. 20
8604 ...	Dynamite	223,570	28,104	.13	av. 48
8609 ...	Other explosives	17,622	2,362	.13	30–53
8625 ...	Safety fuses	8,280	2,250	.27	22–28
8629 ...	Blasting caps	2,478	6,512	2.63	av. 36
9001 ...	Motion picture cameras, substandard gage (less than 35 mm.)	386	1,174	3.04	av. 36
9002.3..	Cameras, aerial, studio, photo-engraving, coin operated and similar types of cameras for professional, scientific, or commercial uses	58	99	1.71	17–40
9003 ...	Cameras, other, box type (set focus)	1,503	894	.59	17–40
9005 ...	Cameras, other	36	70	1.94	av. 40
9006 ...	Parts of cameras, except lenses	1	7	7.00	(2)
9007 ...	Motion picture projectors, standard gage (35 mm.)	272	1,589	5.84	av. 11
9008.1..	Motion picture projectors, substandard gage (less than 35 mm.) silent	690	1,004	1.46	20–28
9008.2..	Motion picture projectors, substandard gage (less than 35 mm.) sound	396	520	1.31	av. 14
9010 ...	Motion picture sound equipment, recording	45	67	1.48	(2)
9011 ...	Motion picture sound equipment, reproducing	6,491	6,102	.94	av. 11
9112 ...	Stereopticons, magic lanterns, and other projection apparatus	413	1,438	3.48	(2)
9142 ...	Ophthalmic lenses	18	44	2.44	9–29
9143 ...	Spectacles, eyeglasses, goggles, lenses,[3] and frames	1,719	2,372	1.38	11–41
9147 ...	Optical lenses, not fitted to instruments	2	38	19.00	av. 45
9149 ...	Other optical goods	358	1,153	3.22	(2)
9160 ...	Surveying and engineering instruments	6,244	8,179	1.31	18–33
9190 ...	Other scientific laboratory and professional instruments and apparatus	7,052	7,616	1.08	3–87
9242 ...	Phonograph records	5,400	2,052	.38	40
	Clocks:				
9570 ...	Electric	101	114	1.13	16
9571 ...	1-day alarm	904	770	.85	26–40
9572 ...	Mantel, novelty, and wall	199	148	.74	26–40
9579 ...	Other, and parts	177	234	1.32	17–48
	Watches:				
9580 ...	Without jewels	89	303	3.40	av. 46
9581 ...	With jewels	417	1,711	4.10	av. 46
9591 ...	Time recording devices and parts	1,754	1,368	.78	(2)
9610 ...	Paintings, etchings, engravings, and statuary	20	43	2.13	(2)
9791 ...	Incandescent mantels	51	176	3.45	9
9792 ...	Lanterns, wick	4,549	2,493	.55	9–17
9793 ...	Gasoline pressure lamps, lanterns and parts	4,005	2,243	.56	3–22
9794 ...	Other lamps, except electric	1,156	959	.83	3–22
9832 ...	Candles	7,782	1,164	.15	23–41
	Total	1,537,798	$337,561		
	IMPORTS				
2559.2..	Orchid plants	18	$621	$34.50	14
2559.3..	Grafted or budded plants, cuttings and seedlings of ornamental trees, shrubs, vines, and all nursery or greenhouse stock[4]	2	3	1.50	(2)
9001.3..	Photo cameras[4] of which the lens is not the component of chief value: Other than motion-picture, all other than box type	8	98	12.25	17–40
	Total	28	$722		

(1) Listed as perishable also.
(2) Not available.
(3) Not elsewhere specified.
(4) Not specially provided for.

TABLE 10.—*United States Trade With Costa Rica—1939*

[Commodities possessing a style factor—category 4]

Class No.	Commodity				
	EXPORTS				
0688 ...	Women's and children's handbags, pocketbooks, and purses, of leather	493	$820	$1.66	5–9
0689 ...	Women's and children's handbags, pocketbooks, and purses, of other materials	14,771	9,217	.62	5–9
0753 ...	Fur wearing apparel	183	1,409	7.70	4–6
3122 ...	Women's dresses and ensembles	738	1,160	1.57	av. 11
3675 ...	Bathing suits, wool, knit	1,034	2,420	2.34	av. 10
3681 ...	Women's and children's wool clothing	1,313	2,955	2.25	av. 16
3742 ...	Silk dresses, skirts and blouses	831	5,841	7.03	av. 10
3759 ...	Other silk wearing apparel	126	419	3.33	8–16
3799 ...	Other silk manufactures	42	185	4.40	av. 8
3852 ...	Dresses, skirts, blouses and other outerwear, not knit or crocheted	914	2,456	2.69	av. 10
3853 ...	Knit or crocheted dresses and ensembles	262	984	3.76	av. 10
3853.2..	Other knit outerwear	160	390	2.43	8–12
3944 ...	Hats, sewed, of straw, palm leaf, etc., not harvest hats	2,147	2,178	1.01	3–10
3945 ...	Hats, woven, of straw, palm leaf, etc., not harvest hats	673	801	1.19	3–10
3952 ...	Women's and girls' furfelt hats	225	658	2.92	3–6
9121.1..	Exposed motion-picture films, negative, features (4,000 lin. ft. or over)	30	233	7.77	av. 40
9121.9..	Exposed motion-picture films, negative, other (less than 4,000 lin. ft.)	10	135	13.50	av. 40
9123.1..	Exposed motion-picture films, positive (4,000 lin. ft. or over)	2,922	5,719	1.96	av. 40
9123.5..	Exposed motion-picture films, positive, newsreels (less than 4,000 lin. ft.)	55	56	1.02	av. 40
9123.9..	Exposed motion-picture films, positive, other (less than 4,000 lin. ft.)	463	1,559	3.37	av. 40
9516 ...	Catalogs and pamphlets	7,383	2,215	.30	30–40
9560 ...	Calendars, printed or unprinted and advertising novelties	3,775	906	.24	30–40
	Total	38,550	$42,716		
	IMPORTS				
9022.1..	Motion-picture film negatives, exposed but not developed, features (4,000 lin. ft. or over)	28	$400	$14.29	av. 40
9022.5..	Shorts, other than news reels (less than 4,000 lin. ft.)	5	13	2.60	av. 40
	Total	33	$413		

Digitized by Google

Appendix

The volume of air cargo which will move between the United States and foreign countries after the war will depend upon a number of economic factors, such as the comparative speeds, costs, reliability, convenience, and quality of service of air carriers compared with surface carriers. A substantial part of air-cargo tonnage which is likely to move will consist of commodities which previously moved by steamship, while an unknown percentage of future air-cargo shipments will consist of new traffic, especially perishables, made possible by the much faster service offered by air carriers.

In initiating this series of studies, it is believed that an analysis of pre-war trade will furnish some indication of the specific commodities that may be diverted to air carriers in the post-war period. Since the year 1939 is the latest period during which United States trade with Latin America did not show the effects of war, it was decided to use the United States export and import statistics for that year as the basis for study. In studying the thousands of commodities which moved between the United States and Latin American countries, it was agreed that at least four basic factors are of major importance in determining which should be selected as offering the best prospects for transport by air. These are as follows: (1) Value per pound, (2) perishability, (3) fragility, and (4) style factor, including obsolescence.

It is recognized that no single one of these factors is necessarily of sufficient importance to justify the higher charges which will have to be made for air carriage in comparison with surface transport. It is also evident that a commodity which appears suitable for air carriage on the basis of only one factor is not as likely to go by air as one which is suitable on the basis of two or more factors. For example, a commodity worth $5 per pound which is also perishable, fragile, or possessed of a style factor is more likely to go by air than a commodity equally valuable lacking any of these other favorable characteristics.

In addition to the four major categories covered in this study there are others which merit investigation. Among these may be mentioned economies in packing, insurance, size of shipment, density, and various capital costs. Not all of these have been investigated here because the foreign trade statistics utilized did not lend themselves to such analyses. The experience of the Army and Navy air-transport services during the present war has demonstrated that substantial packing economies are possible for almost all commodities flown. These economies for certain commodities have reached 70 percent of the total shipping weight, while the average reduction in shipping weight has been reported as approximately 30 percent. A special study of potential packing economies is planned for the commodities included under the four categories shown in this report.

In the past many commodities have been shipped by air to meet emergency situations with little consideration given to cost of service. It is clear that almost any commodity regardless of its economic characteristics may be sent by air under conditions of extreme emergency. Perishable pharmaceuticals and machine tools and parts are classes of commodities which have previously constituted important emergency shipments. Practically all of these are already included in this study because of their high value per pound. In addition to strictly emergency shipments, there will be shipments of odd items for the filling in of inventories where sudden or unexpected increases in demand result in shortages.

Categories Described

In deciding which commodities should be included in the four categories adopted, the question of definition of terms immediately arose, especially in the case of categories 2, 3, and 4 which cover perishability, fragility, and style factor. The bases for selection are briefly described below:

1. Value Per Pound

In determining which commodities should be screened on the basis of value per pound it was necessary to decide first whether net weight or shipping weight should be used, then to decide upon the minimum value per pound, and finally, after a minimum value per pound had been chosen, into how many subclasses the commodities falling above this minimum should be divided.

Since the charges to the shipper are based on gross shipping weights, rather than net weights, it was concluded that such weights were the proper ones to use in an analysis of air-cargo potentials, and they will be used exclusively in each study of the series except the first. The first study covering trade between the United States and Brazil was begun at a time when an adequate body of data on gross shipping weights was not readily available. More recently such data have become available. In the United States-Brazil study, asterisks indicate where net weights are used.

After consultation with various commodity specialists it was decided that all commodities with a value of less than $0.50 per pound should be eliminated from the first category. It was felt that few commodities below that minimum would offer prospects for air carriage in the immediate post-war period. In fact, it is believed that many commodities above $0.50, particularly between $0.50 and $1, offer slight prospects for air-carriage unless additional factors, such as perishability, fragility, or style factor are also involved. A commodity worth $0.50 a pound has a value of $1,000 per ton. If it is assumed that the typical air-borne commodity moves 4,000 miles between the United States and South America and that the air-line charge is $0.15 per ton-mile, then the transportation charges on 1 ton would equal $600 or 60 percent of the value of the commodity. A commodity worth $3 a pound has a value of $6,000 per ton. On the basis of the assumptions just stated, air-cargo charges would amount to $600 or only 10 percent of the value of the commodity. These figures may be compared with the analogous relationships for movement of railway freight in the United States. In 1939 railway freight revenue equalled 8.43 percent of the value of all commodities carried.

The commodities valued at $0.50 per pound and over have been divided into eight groups as follows:

Group 1—$0.50–$0.99 per pound.
Group 2—$1–$1.99 per pound.
Group 3—$2–$2.99 per pound.
Group 4—$3–$3.99 per pound.
Group 5—$4–$4.99 per pound.
Group 6—$5–$9.99 per pound.
Group 7—$10–$24.99 per pound.
Group 8—$25 up per pound.

It is evident not only that the commodities in the higher-value groups offer better prospects for air carriage than those in the lower groups, but also that a larger percentage of the commodities in the higher-value groups are likely to go by air. For example, if 2 percent of the commodities in group 1 appear to offer especially good prospects for air carriage it might be expected that 4 percent in group 2, 6 percent in group 3, and so on would offer similar prospects.

2. Perishability

In determining the list of commodities to be included under the second category, perishability, it was necessary first to define the term perishable. It is evident that a large number of commodities would be perishable if a long enough time period and sufficient exposure to the elements were assumed. In deciding whether or not a commodity is perishable when moving in international trade, consideration has been given only to the normal time spent in transit via usual surface methods of transportation, assuming customary packing, handling, and stowage of the commodity. If, for example, apples packed in barrels can be shipped from New York to Rio de Janeiro in 4 weeks, while apples packed in barrels normally do not deteriorate in less than 8 weeks, then apples, for the purposes of this study, will not be considered perishable. It should be pointed out that any commodity which requires refrigerants, special temperature control, or ventilation during the period of movement is also classed as perishable.

In order to determine which of the commodities met the tests of the definition aforementioned, the cooperation of numerous commodity specialists of the Department of Commerce and other Government agencies was secured.

Digitized by Google

3. Fragility

Fragility, or breakability, is a term which, like perishability, could characterize almost all commodities under certain conditions. For the purposes of this study a commodity is defined as fragile or breakable when special care in handling or special packing is required to avoid damage under normal conditions of shipment. No attempt has been made to classify the commodities selected in respect to differing degrees of fragility.

4. Style Factor

Under the category designated style factor are included all of those commodities which lose their economic value at an exceptionally rapid rate with the passage of time because of a decline in the demand rather than a change in the physical nature of the product. Products which are subject to obsolescence are included. Examples of such are newspapers, motion-picture films, and certain textiles, such as wearing apparel.

Density or Weight

The density or weight per cubic foot of a commodity is one factor affecting the cost of moving commodities. In any transportation vehicle where space rather than weight is the limiting factor, a commodity with a low density costs more per unit of weight to move than one with a higher density, and consequently, must be charged a higher rate per ton-mile. In this series of studies the density is shown where the information is available for all commodities included in the four categories listed above. In some instances, no specific density is shown but instead a density range is given. This indicates a variation in the method of packing. Some commodity classifications, furthermore, cover such a wide range of individual articles lumped together that it is impossible to determine either a *specific* density or a density range. An example of this type of "basket" classification is Export Class No. 0699 (Other Leather Manufactures).

Upon analysis, density appears to be of less importance than the four major criteria already discussed, and, on the basis of new designs for post-war air cargo planes, may become even less significant in the future.

Size of Shipments

The economic and technological characteristics of steamship operations make this form of transportation especially suitable for large shipments of goods weighing many tons. These characteristics are reflected in steamship freight-rate structures which in many instances are quoted in terms of 1 ton or 40 cubic feet. Since it is customary to levy a minimum bill of lading charge, which between the United States and Brazil, for example, amounts to $7.50, as shipments fall below a certain weight, the rate per ton-mile rises progressively so that in the case of shipments of 25 or 50 pounds the rate per ton-mile will be several times that of a shipment weighing 1 ton or more. On such small shipments, therefore, the differences in costs between steamship and air carrier services are reduced to a minimum and air carriers will enjoy their most favorable competitive position.

The only important alternative to the freight services offered by the steamship companies is parcel post, which limits maximum shipments to a few pounds. Frequently, parcel-post charges, when reduced to a rate per ton-mile basis, amount to $0.06 or $0.08 per ton-mile for shipments of 25 to 30 pounds.

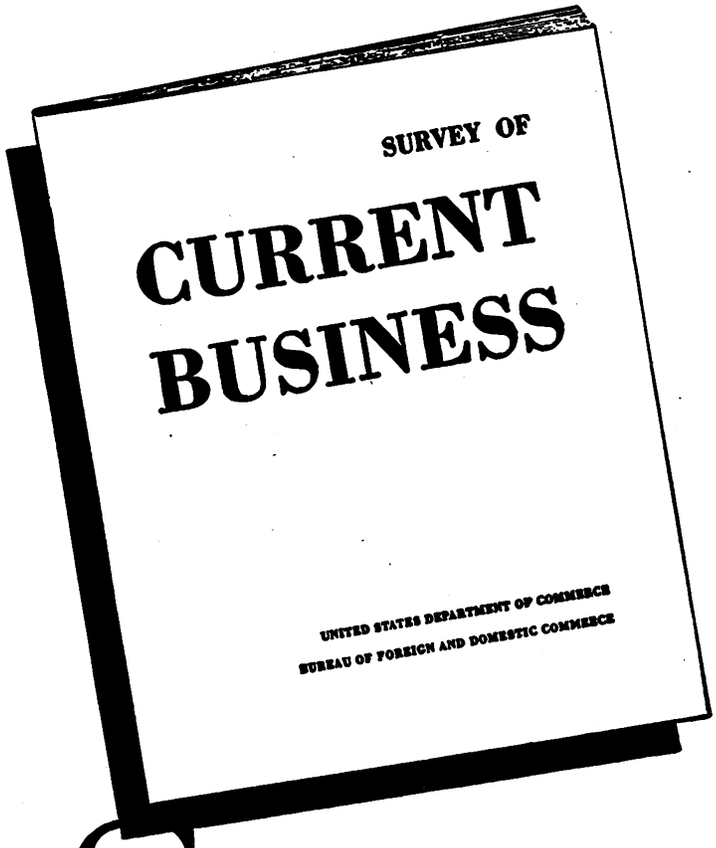
It is impossible to determine from published foreign trade statistics what commodities are shipped in quantities weighing less than 1 ton. The figures show the total weight shipped per year for individual commodities, and, in many instances, such shipments total much less than 2,000 pounds but it can not be determined whether these small shipments were shipped individually or consolidated with other commodities in lots weighing 1 ton or more. In recent years it has become increasingly prevalent for producers and freight forwarders to consolidate small shipments into large ones to take advantage of the lower steamship freight rates available on large shipments.

Post-War Air Cargo Rates

Recent estimates of the level of air cargo rates after the war vary from $0.05 to $0.25 per ton-mile. The differences in the estimates are primarily the result of differences in the assumptions on which the forecasts are based or on the completeness of the services under consideration. Some authorities in estimating air cargo rates have in mind airport-to-airport movement only, while others include terminal handling and pick-up and delivery services. Some writers in making post-war predictions are thinking of the period immediately following the cessation of hostilities rather than developments during the first decade. Still others base their predictions upon the assumption that the latest technological improvements will be incorporated into exclusively designed air cargo planes and that these planes will be available shortly after the war.

In the case of air cargo carriage between the United States and Latin American countries in the immediate post-war period, air cargo rates per ton-mile will depend upon whether the traffic in both directions is sufficiently large to justify specially designed air cargo planes which carry nothing but commodities. If the volume of traffic should prove to be this large, air cargo rates from airport to airport may prove to be feasible at a level of from $0.10 to $0.15 per ton-mile depending upon the territory served. If, on the other hand, air cargo volume proves to be so small that it must be carried in aircraft especially designed for the transportation of passengers and mail, then air cargo rates will probably be substantially higher.

Digitized by Google



$2.00
per year

SURVEY OF CURRENT BUSINESS

THIS AUTHORITATIVE MONTHLY PERIODICAL makes easily available to businessmen over 2,200 comprehensive facts about production, stocks, orders, prices, sales, shipments, etc., of the industries of the United States by means of text, tables, charts, and index numbers.

A sample copy will be sent, on request to the
Bureau of Foreign and Domestic Commerce,
Washington, D. C.

$2.00 per year, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Digitized by Google

Domestic Commerce

written for

BUSINESSMEN . .

● Here is an authoritative monthly periodical written in the language of the American businessman. It is one of the principal organs of the Department of Commerce for disseminating information deemed of importance in maintaining a vigorous and dynamic free enterprise system.

● Domestic Commerce gives the reader an understanding of the progress and changing conditions of industry and business of the United States. Its writers are officials of this and other Government agencies, and specialists in the various subjects covered.

● Particular attention is given to developments in the field of post-war planning.

{ *A sample copy will be sent you upon request to the Bureau of Foreign and Domestic Commerce, Washington 25, D. C.* }

$1.00 per year . . . from the Superintendent of Documents

U. S. GOVERNMENT PRINTING OFFICE • WASHINGTON 25, D. C.

☆ U. S. Government Printing Office : 1946—681913—137

Digitized by Google

Documents Room

Gov. Doc.

Industrial Reference Service

U. S. DEPARTMENT OF COMMERCE, HENRY A. WALLACE, *Secretary*
Bureau of Foreign and Domestic Commerce, AMOS E. TAYLOR, *Director*

Part 1. TRANSPORTATION and PUBLIC UTILITIES

Available in Parts Covering Selected Services and Commodities
Annual Subscription $1.50. Price this report 5 cents
For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., or any of the Department's Field Offices

Volume 4—Part 1 | June 1946 | Number 7

L 14739

INDIANA UNIVERSITY
JUL 24 1946
LIBRARY

Air-Cargo Potentials *between* Switzerland *and* Non-European Regions



Prepared by Trade Statistics Division, Christopher Roberts, Chief
and
Transportation Division, James C. Nelson, Chief

Digitized by Google

EDITOR'S NOTE.—Transportation of cargo by air will be one of the major developments of postwar United States trade. When global airway networks are established, the world will be an open market, for then the limitations imposed on trade by physical barriers and by time and distance will be even further minimized.

Data on cargo which might move by air in a peacetime year as studied by the Bureau of Foreign and Domestic Commerce are being issued in two separate series of reports under the general title "Air-Cargo Potentials." The first series presented air-cargo potentials between the United States and individual Latin American Republics and South Africa based upon United States trade statistics for 1939.

The second series, of which this is the first issue, showing in a broad picture the higher-valued trade of the major European countries with the world's large continental areas, was undertaken to indicate the general types of commodities, and the volume and value of the trade, that would merit attention by United States air-line officials and traffic managers, shippers, regulatory bodies, and others interested in air cargo transportation between Europe and the rest of the world, including the United States.

The basic data contained in the European series will be of assistance to United States exporters and importers in helping them to determine not only which products can most advantageously be shipped by air, but also the volume and types of aircraft which will be necessary adequately to handle air-borne cargoes.

Contents

	Page
Explanatory Data	3
Summary of Air-Cargo Potentials	4
Value of Foreign Trade	4
Distribution by World Regions	4
Distribution by Value-Per-Pound	5
Export Air-Cargo Potentials	5
Principal Export Commodity Groups	5
Principal Exports by Value-Per-Pound	6
Import Air-Cargo Potentials	9
Principal Import Commodity Groups	9
Principal Imports by Value-Per-Pound	10
Conclusion	12
Appendix:	
United States Actual Imports by Air From Switzerland, July 1944-June 1945	27
Analytical Tables:	
Table 1.—Value of Switzerland's Foreign Trade, 1938	4
Table 2.—Distribution of Selected Exports and Imports by World Regions	4
Table 3.—Percentage Distribution of Selected Swiss Exports and Imports by Value-Per-Pound Ranges, 1938	4
Table 4.—Principal Commodity Groups of Selected Swiss Exports on Bases of Total Weight and Value, by Non-European Regions, 1938	5
Table 5.—Clocks and Watches Exported by Switzerland, 1938	6
Table 6.—Principal Selected Swiss Exports by Value-Per-Pound Ranges and Regions, 1938	7
Table 7.—Principal Commodity Groups of Selected Swiss Imports on Bases of Total Weight and Value by Non-European Regions, 1938	9
Table 8.—Principal Selected Swiss Imports by Value-Per-Pound Ranges and Regions, 1938	10
Switzerland:	
Summary Tables:	
Table 9.—Summary of Selected Exports and Imports by Regions and Value-Per-Pound Ranges, 1938	13
Table 10.—Summary of Selected Exports by Regions and Commodity Groups, 1938	13
Table 11.—Summary of Selected Imports by Regions and Commodity Groups, 1938	14
Export Tables:	
Table 12.—Selected Exports to North America by Commodity Groups and Value-Per-Pound Ranges, 1938	15
Table 13.—Selected Exports to Middle America by Commodity Groups and Value-Per-Pound Ranges, 1938	16
Table 14.—Selected Exports to South America by Commodity Groups and Value-Per-Pound Ranges, 1938	17
Table 15.—Selected Exports to Africa by Commodity Groups and Value-Per-Pound Ranges, 1938	18
Table 16.—Selected Exports to Asia by Commodity Groups and Value-Per-Pound Ranges, 1938	18
Table 17.—Selected Exports to Oceania by Commodity Groups and Value-Per-Pound Ranges, 1938	19
Table 18.—Selected Exports to U.S.S.R. by Commodity Groups and Value-Per-Pound Ranges, 1938	20
Table 19.—Selected Exports to the United States by Commodity Groups and Value-Per-Pound Ranges, 1938	21
Import Tables:	
Table 20.—Selected Imports From North America by Commodity Groups and Value-Per-Pound Ranges, 1938	22
Table 21.—Selected Imports From Middle America by Commodity Groups and Value-Per-Pound Ranges, 1938	23
Table 22.—Selected Imports from South America by Commodity Groups and Value-Per-Pound Ranges, 1938	23
Table 23.—Selected Imports from Africa by Commodity Groups and Value-Per-Pound Ranges, 1938	24
Table 24.—Selected Imports from Asia by Commodity Groups and Value-Per-Pound Ranges, 1938	24
Table 25.—Selected Imports from Oceania by Commodity Groups and Value-Per-Pound Ranges, 1938	25
Table 26.—Selected Imports from U.S.S.R. by Commodity Groups and Value-Per-Pound Ranges, 1938	26
Table 27.—Selected Imports from the United States by Commodity Groups and Value-Per-Pound Ranges, 1938	26
Appendix Table:	
United States Actual Imports by Air from Switzerland by Value-Per-Pound Ranges, July 1944-June 1945	28

Cover map furnished through courtesy of Brookings Institution

Digitized by Google

Air-Cargo Potentials Between Switzerland and Non-European Regions

Europe should be emphasized in a study of intercontinental air-cargo potentials because of its leading role in world commerce and its advantageous geographical position for air transportation.

Europe is the geographical center of that half of the globe which contains 94 percent of the people and 98 percent of all the industrial activities of the world.[1] Besides being the hub of the "principal hemisphere," Greater Europe, before the war, had the largest urban population, the greatest amount of national income, and the largest volume of international trade of any of the great trading areas.[2] With the development of a system of world-wide air-cargo transportation, the European area will come into even sharper focus.

To show the significance of the European area as an origin and destination for world air cargo, the international trade between 11 of the principal countries in Greater Europe and 7 continental regions (excluding Greater Europe), has been selected for study. In addition to Switzerland, the subject of this report, these countries are Belgium-Luxemburg, Czechoslovakia, Eire, France, Germany, Italy, the Netherlands, Poland-Danzig, Sweden, and the United Kingdom.

The seven continental trade regions referred to above are North America, Middle America, South America, Africa, Asia, Oceania, and the U. S. S. R. In the case of North America, the trade between the selected European countries and the United States is shown separately also in order that it can be given detailed study by exporters and importers, air-line executives, and other businessmen in the United States.

Explanatory Data

The eight world trade regions,[3] including Greater Europe, referred to in this series may be described as follows:

Greater Europe includes continental Europe, the British Isles, Iceland, Mediterranean Africa, and Mediterranean Asia.

North America includes the United States, Canada, Newfoundland and Labrador, Greenland, St. Pierre and Miquelon Islands, Alaska, and Hawaii.

Middle America includes Mexico, Central America, West Indies, and the South American countries bordering the Caribbean (Colombia, Venezuela, and the Guianas).

South America excludes the countries bordering the Caribbean (included in the Middle American region, i. e., Colombia, Venezuela, and the Guianas).

Africa excludes the Mediterranean area (included in the region of Greater Europe).

Asia includes Japan, the Philippine Islands, and the East Indies, but excludes that part of continental Asia included in the Greater European region and the U. S. S. R.

Oceania includes Australia, New Zealand, and other islands in the Pacific not included in the Asiatic or North American regions.

U. S. S. R.: Union of Soviet Socialist Republics.

There are certain basic differences between the European and the United States-Latin American series which should be noted at the outset. In the first place, the European series is a continent-to-continent study, whereas the other series is a country-to-country study. In order to make continental summations and comparisons, it was necessary to convert the official foreign trade statistics of the selected European countries, used as primary data in this study, to some common denominator. For this purpose, the commodity classification used for the presentation of United States export data, the pound weight, and United States dollar were utilized since they are familiar to the American businessman.

In the second place, the single criterion of value per pound (shipping weight), was used in the selection of commodities for the European study of air-cargo potentials, whereas that criterion plus factors of perishability, fragility, and style were used in the United States-Latin American series. This single criterion was used in the European series largely because of the multitudinous problems involved in the use of foreign source materials in this fashion, and it was thought that this was the most important single factor that could be utilized.

The statistical work and analysis was performed in the Trade Statistics Division by Jettie Turner with the assistance of other members of the staff, under the general supervision of Elma S. Moulton. The textual discussion was prepared jointly by the Trade Statistics Division and the Transportation Division.

In the third place, the European series was based on data for the year 1938, the last prewar calendar year in Europe. The United States-Latin American series, on the other hand, used data for 1939, as that was considered the last normal prewar year for United States trade.

It should be borne in mind, however, that the purpose of both studies is to indicate the range of *potential* air-cargo traffic, as to type of commodities, and their volume and value; it is not the purpose to predict the actual volume and value of goods which will be carried by air transport in the future.

Methodology

For convenient reference, there are summarized here the source of the trade data used in the Switzerland report, the criterion applied in selecting the commodities that might move by air, and the factors used in converting the selected trade data from Switzerland's customary weights and monetary units into pounds and dollars.

Source of primary data.—The primary data used in this report are from the official foreign trade statistics of Switzerland as presented in "Statistique Annuelle du Commerce Exterieur de la Suisse, 1938."

Country distributions.—Complete country distribution is not available in the official foreign trade statistics of Switzerland. The residual group, "Other countries," has been excluded from this report because it was not possible to determine whether the data were chiefly for European or non-European countries.

Commodity selection.—The commodities included in this report were chosen on a value-per-pound basis. Only commodities for which total export or import trade value averaged 25 cents or more per pound (shipping weight) were used. Trade with individual non-European countries in these selected commodities was excluded when the country's average fell below this value.

Commodity classification.—In order to facilitate the comparison of trade of the different countries, individual commodities were arranged according to the classification in the United States Export Schedule B. These items were then totaled for the Schedule's 88 subgroups. All data in this report are shown in terms of these subgroup totals, with the 15 largest items in each area shown separately if in excess of 50,000 pounds.

Conversion factors.—The following factors were used for conversion of

[1] J. Parker Van Zandt, The Geography of World Air Transport, Brookings Institution, Washington, D. C., 1944, p. 4.
[2] Ibid, pp. 13, 15, 55.
[3] Ibid, p. 9.

Digitized by Google

Switzerland's original data, which were expressed in kilograms (net) and Swiss francs: One kilogram=2.2046 pounds. One Swiss franc=$0.2287 (1938 exchange rate).

Shipping weight.—Shipping weight (net weight plus tare weight) was calculated on the basis of the ratios of shipping weight to net weight as found in the 1943 export and import trade of the United States. When items or commodities were not comparable with the United States classifications, commodity analysts of the Bureau of Foreign and Domestic Commerce were consulted.

Exclusions.—Gold and silver ore, bullion, and coin have been excluded from this report, as have complete airplanes which are likely to move under their own power. Exports of imported merchandise have been excluded.

Summary of Air-Cargo Potentials

Value of Foreign Trade

In 1938, the total value of the combined exports and imports of Switzerland was $669,000,000, placing that country in eighth position among the 11 European countries selected for study in this series. Table 1 shows that although the value of commodities identified in this report as potential air cargo with non-European areas amounted to $79,000,000, or only 12 percent of the total value of Swiss foreign trade in 1938, air-cargo potential trade amounted to 47 percent of Switzerland's total non-European trade of approximately $170,000,000.

On the basis of value per pound, the prospects for developing a volume of air movement of Swiss exports seem somewhat more favorable than for imports. Table 2 shows that selected exports to most regions have higher average values per pound than selected imports from the same regions. Moreover, a comparison of the tonnage of Switzerland's selected exports and imports in 1938 shows that the 45,000,000 pounds of exports in this category were more than 1½ times the 28,000,000 pounds of selected imports.

In terms of value, the export air-cargo potentials exceeded the import potentials by an even greater ratio—the selected exports of $65,000,000 were about 4½ times the $15,000,000 of selected imports. This unbalanced situation is accounted for by the fact that the value per pound of selected exports in 1938 averaged $1.43, whereas the value per pound of selected imports averaged only $0.52.

Distribution by World Regions

Reference to table 2 also shows that the regions of North America, Asia, and South America are the predominant participators in potential air exports from Switzerland, with North America leading in value but not in volume.

TABLE 1.—*Value of Switzerland's Foreign Trade, 1938*

[In thousands of dollars.]

Item	Total		Exports		Imports	
	Value	Percent	Value	Percent	Value	Percent
Total trade, 1938	668,599	100.0	301,100	100.0	367,499	100.0
Trade with Greater European countries	499,027	74.6	218,666	72.6	280,361	76.3
Trade with non-European countries	169,572	25.4	82,434	27.4	87,138	23.7
Air-cargo potential trade with non-European countries	79,334	11.9	64,829	21.5	14,505	3.9
Air-cargo potential trade in relation to total non-European trade		46.8		78.6		16.6

TABLE 2.—*Distribution of Selected Exports and Imports by World Regions*

[Quantity in thousands of pounds; value in thousands of dollars.]

Regions	Quantity	Percent of total	Value	Percent of total	Average value per pound
Selected exports					
All areas, total	45,332	100.0	64,829	100.0	$1.43
North America	9,980	22.0	19,687	30.4	1.97
Middle America	4,056	8.9	4,519	7.0	1.11
South America	10,048	22.2	12,084	18.6	1.20
Africa	3,752	8.3	3,663	5.6	.98
Asia	12,284	27.1	18,356	28.3	1.49
Oceania	3,048	6.7	4,338	6.7	1.42
U. S. S. R.	2,164	4.8	2,182	3.4	1.01
United States [1]	7,641	16.9	16,649	25.7	2.18
Selected imports					
All areas, total	27,880	100.0	14,505	100.0	.52
North America	9,183	32.9	5,789	40.0	.63
Middle America	106	.4	117	.8	1.10
South America	1,524	5.5	512	3.5	.34
Africa	1,004	3.6	325	2.2	.32
Asia	8,774	31.5	5,270	36.3	.60
Oceania	7,133	25.6	2,058	14.2	.29
U. S. S. R.	156	.5	434	3.0	2.78
United States [1]	8,711	31.2	5,513	38.0	.63

[1] Included in North America.

TABLE 3.—*Percentage Distribution of Selected Swiss Exports and Imports by Value-Per-Pound Ranges, 1938*

Region	Total		25 cents to 49 cents per pound		50 cents to 99 cents per pound		$1.00 and over per pound	
	Pounds	Dollars	Pounds	Dollars	Pounds	Dollars	Pounds	Dollars
Selected exports, total	100.0	100.0	55.2	12.3	15.5	8.4	29.3	79.3
North America	100.0	100.0	46.2	8.0	11.0	4.8	42.8	87.2
Middle America	100.0	100.0	70.7	19.8	4.4	2.9	24.9	77.3
South America	100.0	100.0	67.8	17.7	10.5	6.1	21.7	76.2
Africa	100.0	100.0	68.3	22.6	18.5	14.5	13.2	62.9
Asia	100.0	100.0	48.7	10.0	18.7	9.7	32.6	80.3
Oceania	100.0	100.0	55.0	11.6	9.0	5.1	36.0	83.3
U. S. S. R.	100.0	100.0	23.7	7.9	65.6	52.0	10.7	40.1
United States [2]	100.0	100.0	43.4	7.0	6.7	2.4	49.9	90.6
Selected imports, total	100.0	100.0	75.5	47.5	15.2	18.5	9.3	34.0
North America	100.0	100.0	56.3	31.3	30.0	28.5	13.7	40.2
Middle America	100.0	100.0	47.8	12.1	13.7	11.2	38.5	76.7
South America	100.0	100.0	95.1	82.1	2.3	4.3	2.6	13.6
Africa	100.0	100.0	88.0	74.8	11.8	22.2	.2	3.0
Asia	100.0	100.0	71.6	44.1	14.7	17.2	13.7	38.7
Oceania	100.0	100.0	99.9	99.5	.1	.1	([1])	.4
U. S. S. R.	100.0	100.0	59.2	7.4	12.3	2.5	28.5	90.1
United States [2]	100.0	100.0	54.9	30.6	30.9	29.3	14.2	40.1

[1] Less than one-tenth of one percent.
[2] Included in North America.

These three regions together received 77 percent by value and 71 percent by volume of the potential air cargo. The United States received the greater part of both value and tonnage of Swiss exports to North America.

The region of Oceania replaces South America as a predominant participator in Swiss import air-cargo potentials. The three regions of North America, Asia, and Oceania together provide approximately 90 percent of the value and volume of import potential air commodities. Again, the United States was the source of the greater part of the selected imports from North America by Switzerland.

It will be noted that the total volume of selected Swiss exports to North America approximates the total volume of selected imports from that region. On the other hand, the selected ex-

Digitized by Google

ports and imports in the case of the other areas are greatly unbalanced.

Table 2 reveals that the average value per pound of selected Swiss exports to all areas except the U.S.S.R. exceeded considerably the average values per pound of selected imports from the corresponding areas. It is of interest to note that the Swiss commodities exported to the United States averaged $2.18 per pound whereas those imported from the United States averaged only 63 cents per pound.

Distribution by Value per Pound

The Swiss exports and imports selected as having possibilities for air movement have been classified into three value-per-pound groups: (1) Commodity groups averaging $0.25 to $0.49 per pound; (2) groups averaging $0.50 to $0.99 per pound; and (3) groups averaging $1.00 per pound or more.

Table 3 reveals that both selected export and import tonnages were heaviest in the 25 cents to 49 cents per pound group totals, and for all areas except for exports to the U. S. S. R. This fact was very pronounced in the case of Swiss imports, more than three-fourths of the total import potentials being in this value group. Forty-three percent of selected Swiss exports to the United States and 55 percent of selected Swiss imports from the United States were in the 25 cents to 49 cents range.

On the other hand, when Swiss potential air cargo traffic is measured in terms of total value, the largest portion (nearly 80 percent) of total exports falls in the group averaging $1.00 per pound or more. This relationship holds for all the separate areas except the U. S. S. R., for which the largest portion of the total selected exports is in the 50 cents to 99 cents per pound group. In the case of selected Swiss exports to the United States, more than 90 percent of the value is in the highest value range. The situation is mixed in the case of selected imports. Values of Swiss imports from South America, Africa, Asia, and Oceania were concentrated in the lowest value group, whereas those of North America, Middle America, and the U. S. S. R. were largest in the group averaging $1.00 per pound or more.

Export Air-Cargo Potentials

Principal Export Commodity Groups

To facilitate analysis, the principal commodity groups by order of magnitude of total tonnage and value which accounted for at least one-half of the Swiss exports averaging 25 cents per pound or more to each of the several trade regions were segregated.

Three commodity groups—industrial machinery, electrical machinery, and nonferrous ores, metals, and alloys—

TABLE 4.—*Principal Commodity Groups of Selected Swiss Exports on Bases of Total Weight and Value, by Non-European Regions, 1938*

[Shipping weight in thousands of pounds; value in thousands of dollars.]

Principal export commodity groups on basis of total weight		Principal export commodity groups on basis of total value	
Commodity group	Shipping weight	Commodity group	Value
All areas, total	45,332	All areas, total	$64,829
Industrial machinery	12,691	Clocks and watches	24,547
Electrical machinery and apparatus	6,951	Industrial machinery	5,956
Nonferrous ores, metals, and alloys, except precious [1]	5,284	Firearms, ammunition and fireworks	5,867
North America, total	9,980	North America, total	19,687
Nonferrous ores, metals, and alloys, except precious [2]	2,430	Clocks and watches	10,139
Coal-tar products	1,943	Coal-tar products	2,312
Electrical machinery and apparatus	1,056	Cotton manufactures	1,435
Middle America, total	4,056	Middle America, total	4,519
Electrical machinery and apparatus	856	Clocks and watches	1,596
Nonferrous ores, metals, and alloys, except precious [3]	708	Medicinal and pharmaceutical preparations	710
Industrial machinery	647	Cotton manufactures	436
South America, total	10,048	South America, total	12,084
Electrical machinery and apparatus	2,430	Clocks and watches	4,007
Industrial machinery	2,248	Medicinal and pharmaceutical preparations	1,339
Nonferrous ores, metals, and alloys, except precious [3]	865	Firearms, ammunition and fireworks	1,171
Africa, total	3,752	Africa, total	3,663
Industrial machinery	1,646	Clocks and watches	1,401
Cotton manufactures	657	Cotton manufactures	587
		Industrial machinery	557
Asia, total	12,284	Asia, total	18,356
Industrial machinery	4,705	Clocks and watches	5,164
Cotton manufactures	1,411	Firearms, ammunition and fireworks	4,661
Coal-tar products	1,203	Industrial machinery	1,995
Electrical machinery and apparatus	1,057		
Oceania, total	3,048	Oceania, total	4,338
Electrical machinery and apparatus	1,097	Clocks and watches	1,968
Industrial machinery	572	Rayon, nylon, and other synthetic textiles	492
Cotton manufactures	320	Cotton manufactures	478
U. S. S. R., total	2,164	U. S. S. R., total	2,182
Industrial machinery	1,958	Industrial machinery	1,427
		Clocks and watches	273
United States, total [4]	7,641	United States, total [4]	16,649
Nonferrous ores, metals, and alloys, except precious [3]	2,327	Clocks and watches	8,884
Coal-tar products	1,406	Coal-tar products	1,809
Industrial machinery	766	Cotton manufactures	1,187

[1] Aluminum and manufactures make up 92 percent of tonnage of this group, divided between aluminum and alloys, hammered, in bars, sheets, etc., and goods of aluminum for other than industrial and construction uses.

[2] Chiefly goods of aluminum for other than industrial and construction uses.

[3] Chiefly aluminum and alloys, hammered, in bars, sheets, pipes, wire; and stamped washers.

[4] Included in North America.

comprised more than one-half of the total tonnage of selected Swiss exports to the seven non-European trade regions in 1938. Table 4 shows that industrial machinery, which contributed more than 12,500,000 pounds of the total, or approximately 28 percent of selected Swiss exports in 1938, was the most important commodity group on a tonnage basis from which air-cargo traffic might be solicited. Electrical machinery and nonferrous ores together added another 12,000,000 pound of the tonnage of selected export commodities. The principal selected exports to the United States in 1938 included coal-tar products but excluded electrical machinery.

Machinery, in addition to being an outstanding export by volume, is often well suited to air transportation. Production is frequently contingent upon the arrival of new machinery. Many pieces of machinery and parts are required, furthermore, for replacement and repair of broken-down machines. Such items can often bear a very high air transportation charge since their absence ties up production.

Nonferrous ores, metals, and alloys, on the other hand, are not so well suited to air transportation. Transportation of these commodities is geared to the production rate of the mills and plants using them as raw materials. It makes little difference about the speed of transportation as long as the

Digitized by Google

quantity shipped assures a constant volume of receipts.

When the principal commodity groups averaging 25 cents or more per pound are selected on the basis of dollar value, clocks and watches, firearms and ammunition, and medicinals and pharmaceuticals are added to the list of those chosen on the basis of total tonnage. It will be noted from table 4 that industrial machinery is the only commodity group which ranks high in both volume and value for all areas. This position was attained despite that commodity's relatively low average value per pound of 47 cents. Coal-tar products, cotton manufactures, and medicinals and pharmaceuticals ranked relatively high in both volume and value, and together comprise about one-fourth of selected Swiss exports to all areas.

Clocks and watches, in 1938, because of their high average value per pound of $23, accounted for 38 percent of the total value of selected Swiss exports and ranked first among Swiss exports by value to the United States and all trade areas except the U. S. S. R. Measured in terms of tonnage, however, clocks and watches accounted for only 2 percent of the total selected Swiss exports. The shipping weight, value, and value per pound of Swiss clocks and watches exported in 1938 to each non-European region and the United States is shown in table 5. It will be observed that North America received on a value basis more than 40 percent of the clocks and watches exported, the majority of which went to the United States.

TABLE 5.—*Clocks and Watches Exported by Switzerland, 1938*

[Shipping weight in pounds; value in dollars.]

Region	Shipping weight	Value	Value per pound
All areas, total	1,068,697	24,546,773	$22.97
North America	353,321	10,139,031	28.70
Middle America	71,911	1,595,694	22.19
South America	157,872	4,006,563	25.38
Africa	62,102	1,401,116	22.56
Asia	318,716	5,163,607	16.20
Oceania	99,983	1,967,844	19.68
U. S. S. R.	4,792	272,918	56.95
United States [1]	299,506	8,884,132	29.66

[1] Included in North America.

Principal Exports by Value per Pound

To summarize Switzerland's selected export trade on the basis of value per pound, the largest commodity groups in each value-per-pound range have been arranged by magnitude of pounds by area. About 75 percent of the shipping weight and dollar value of the selected exports to each area has been accounted for in this selection.

The detailed data in table 6 reveal that industrial machinery; electrical machinery; nonferrous metals and alloys; medicinal and pharmaceutical preparations; rayon, nylon, and other synthetic textiles; and musical instruments comprise the principal selected export commodity groups within the lowest value range. These six items constitute 88 and 86 percent of the shipping weight and dollar value of the total Swiss exports in 1938 with an average value of 25 cents to 49 cents per pound, and the first three comprise 79 and 77 percent, respectively.

Industrial machinery, electrical machinery, and nonferrous metals and alloys also appear among the principal selected exports having a value of 50 cents to 99 cents per pound but are not repeated in the $1-per-pound or more range. Cotton manufactures and coal-tar products appear as principal selected exports in both the middle and highest value-per-pound ranges, whereas clocks and watches, and firearms, ammunition, and fireworks are included only in the highest value group of $1 per pound or more.

Industrial machinery comprises about one-half of both the shipping weight and value of the selected Swiss exports with a value of 50 cents to 99 cents per pound. In the highest value-per-pound range, cotton manufactures, coal-tar products, and medicinal and pharmaceutical preparations accounted for 54 percent of the shipping weight, but clocks and watches alone accounted for 48 percent of the dollar value.

Considering the great distances involved between Switzerland and most of the non-European trade regions, it would appear that the export commodity groups in the $1 or more value-per-pound range would have the best prospects for air movement under existing levels of air-cargo cost. Commodities having a high average value per pound are especially suitable for air shipment, since the transportation charge comprises only a small percentage of the total value of the shipment. The marketing margins on watches, for example, are so wide that air transportation charges may often be absorbed therein.

Clocks and watches, firearms and ammunition, and medicinals and pharmaceuticals, because of their high average value per pound, require a relatively large capital investment to maintain an adequate inventory. These financing requirements may be lessened by faster transportation. Cotton manufactures, with a somewhat lower average value per pound, possess a style factor which places added emphasis on these commodities reaching the market promptly. Experience in the United States in the shipment of style goods, especially dresses, indicates that these commodities can often bear a high transportation rate.

Other Swiss exports which seem to merit consideration on the basis of high value per pound include rayon, nylon, and other synthetic textiles, and soap and toilet preparations. It will be noted that many of these commodities are included in the list of Swiss exports to the United States.

Some of the items noted above as suitable for air movement also appear in the 50-cents to 99-cents-per-pound range. Most of the items in the 25-cents to 49-cents value group to all areas appear to have heavy loading characteristics, which, in connection with their low average values per pound, will probably render them less likely to be shipped by air.

Digitized by Google

TABLE 6.—*Principal Selected Swiss Exports by Value-per-Pound Ranges and Regions, 1938*

[Shipping weight in thousands of pounds; value in thousands of dollars.]

Principal selected exports	Shipping weight	Value	Value per pound	Percent of area total	
				Quantity	Value
25 CENTS TO 49 CENTS PER POUND					
All areas, total	25,027	7,963	$0.32	100	100
Industrial machinery	9,023	2,856	.32	36	36
Electrical machinery	5,731	1,668	.29	23	21
Nonferrous ores, metals, and alloys, except precious	4,984	1,592	.32	20	20
Medicinal and pharmaceutical preparations	854	281	.33	3	3
Rayon, nylon, and other synthetic textiles	692	270	.39	3	3
Musical instruments	617	215	.35	3	3
Total, principal commodity groups	21,901	6,882	.31	88	86
North America, total	4,613	1,584	.34	100	100
Nonferrous ores, metals, and alloys, except precious	2,425	840	.35	53	53
Goods of aluminum, except industrial	2,332	798	.34	51	50
Electrical machinery	987	296	.30	21	19
Dynamos and transformers	855	239	.26	19	15
Industrial machinery	441	173	.39	10	11
Machinery for manufacturing and processing foods	220	88	.40	5	6
Musical instruments (phonographs, gramophones, etc.)	302	129	.43	6	8
Total, principal commodity groups	4,155	1,438	.35	90	91
Middle America, total	2,861	896	.31	100	100
Electrical machinery and apparatus	735	214	.29	26	24
Dynamos and transformers	629	166	.26	22	19
Nonferrous ores, metals, and alloys, except precious	698	197	.28	24	22
Aluminum and alloys, hammered, in bars, sheets, etc.	470	128	.27	16	14
Goods of aluminum, except industrial	228	69	.30	8	8
Industrial machinery	590	192	.32	21	21
Hydraulic and wind motors and pumps	311	91	.29	11	10
Total, principal commodity groups	2,023	603	.30	71	67
South America, total	6,811	2,136	.31	100	100
Electrical machinery and apparatus	2,137	587	.27	31	28
Dynamos and transformers	1,947	504	.26	29	24
Industrial machinery	2,055	643	.31	30	30
Weaving machinery	402	139	.35	6	6
Stationary steam engines, etc.	321	101	.32	5	5
Hydraulic and wind motors and pumps	299	99	.33	4	5
Nonferrous ores, metals, and alloys, except precious	607	181	.30	9	9
Aluminum and alloys, hammered, in bars, etc.	558	160	.29	8	8
Steel mill manufactures	524	202	.39	8	9
Pipe fittings	502	194	.39	7	9
Rayon, nylon, and other synthetic textiles	455	181	.40	7	8
Artificial silk yarn, crude, etc.	426	168	.39	6	8
Total, principal commodity groups	5,778	1,794	.31	85	84
Africa, total	2,564	827	.32	100	100
Industrial machinery	1,629	538	.33	63	65
Machinery for manufacturing and processing of foodstuffs	760	206	.27	30	25
Hydraulic and wind motors and pumps	617	248	.40	24	30
Nonferrous ores, metals, and alloys, except precious	456	148	.33	18	18
Goods of aluminum, except industrial	228	72	.32	9	9
Aluminum and alloys, hammered, in bars, etc.	222	74	.33	9	9
Total, principal commodity groups	2,085	686	.33	81	83
25 CENTS TO 49 CENTS PER POUND—Continued					
Asia, total	5,984	1,843	$0.31	100	100
Industrial machinery	3,392	1,005	.30	57	55
Machinery for manufacturing and processing foodstuffs	1,143	315	.28	19	17
Stationary steam engines, steam dredges, etc.	1,103	356	.32	18	19
Hydraulic and wind motors and pumps	839	232	.28	14	13
Electrical machinery	633	211	.33	10	11
Dynamos and transformers	308	90	.29	5	5
Electric locomotives	261	95	.36	4	5
Nonferrous ores, metals, etc.	579	167	.29	10	9
Aluminum and alloys, hammered, in bars, etc.	413	112	.27	7	6
Total, principal commodity groups	4,604	1,383	.30	77	75
Oceania, total	1,677	502	.30	100	100
Electrical machinery	962	282	.29	57	56
Dynamos and transformers	739	186	.25	44	37
Mercury power rectifiers	223	96	.43	13	19
Industrial machinery	404	132	.33	24	26
Machinery for the manufacture and processing of foodstuffs	193	59	.30	12	12
Stationary steam engines, steam dredges, etc.	113	43	.39	7	9
Total, principal commodity groups	1,366	414	.30	81	82
U. S. S. R., total	512	173	.34	100	100
Industrial machinery	512	173	.34	100	100
Machinery for the manufacture and processing of foods	507	171	.34	99	99
Total, principal commodity groups	512	173	.34	100	100
United States, total[1]	3,315	1,169	.35	100	100
Nonferrous ores, metals, and alloys, etc.	2,323	794	.34	70	68
Goods of aluminum, except industrial	2,323	794	.34	70	68
Industrial machinery	338	134	.40	10	11
Machinery for manufacture and processing foods	183	75	.41	6	6
Musical instruments (phonographs and gramophones)	302	129	.43	9	11
Total, principal commodity groups	2,963	1,057	.36	89	90
50 CENTS TO 99 CENTS PER POUND					
All areas, total	7,024	5,476	.78	100	100
Industrial machinery	3,132	2,418	.77	45	44
Coal-tar products	1,256	1,120	.89	18	20
Electrical machinery	772	545	.71	11	10
Cotton manufactures	658	524	.80	9	10
Nonferrous ores, metals, and alloys, except precious	258	182	.71	4	3
Total, principal commodity groups	6,076	4,789	.79	87	87
North America, total	1,097	942	.86	100	100
Coal-tar products	534	510	.96	49	54
Colors from aniline, etc.	519	497	.96	47	53
Musical instruments (music boxes, barrel organs, etc. and parts)	180	175	.97	16	19
Industrial machinery	120	98	.81	11	10
Total, principal commodity groups	834	783	.94	76	83
Middle America, total	179	128	.72	100	100
Electrical machinery and apparatus	73	51	.70	41	40
Mercury power rectifiers	53	38	.73	29	30
Industrial machinery	55	36	.65	30	28
Rayon, nylon, and other synthetic textiles	30	26	.85	17	20
Total, principal commodity groups	158	113	.72	88	88

[1] Included in North America.

Digitized by Google

TABLE 6.—*Principal Selected Swiss Exports by Value-per-Pound Ranges and Regions, 1938—Continued*

[Shipping weight in thousands of pounds; value in thousands of dollars.]

Principal selected exports	Shipping weight	Value	Value per pound	Percent of area total	
				Quantity	Value
50 CENTS TO 99 CENTS PER POUND—Continued					
South America, total	1,057	739	$0.70	100	100
Nonferrous ores, metals, and alloys, except precious	246	175	.71	23	24
Goods of nickel or nickel alloy	192	144	.75	18	19
Electrical machinery and apparatus	209	148	.71	20	20
Mercury power rectifiers	195	137	.70	18	19
Industrial machinery	164	104	.63	16	14
Coal-tar products	113	87	.77	11	12
Colors from aniline, anthracene, etc	71	60	.83	7	8
Rayon, nylon, and other synthetic textiles	78	45	.57	7	6
Artificial silk yarn, crude, etc	66	38	.57	6	5
Total, principal commodity groups	810	559	.69	77	76
Africa, total	696	533	.77	100	100
Cotton manufactures	580	458	.79	83	86
Fabrics	417	311	.74	60	58
Embroideries	163	148	.91	23	28
Electrical machinery	82	52	.63	12	10
Mercury power rectifiers	68	43	.63	10	8
Total, principal commodity groups	662	510	.77	95	96
Asia, total	2,300	1,777	.77	100	100
Industrial machinery	1,309	978	.75	57	55
Machine tools for working metal, wood, and stone	1,153	868	.75	50	49
Coal-tar products	504	433	.86	22	24
Colors from aniline, anthracene, etc	465	408	.88	20	23
Total, principal commodity groups	1,813	1,411	.78	79	79
Oceania, total	275	222	.81	100	100
Industrial machinery	122	97	.80	44	44
Machine tools for working metal, wood, stone, etc	95	80	.84	35	36
Coal-tar products (colors from aniline, anthracene, etc.)	106	90	.85	39	40
Total, principal commodity groups	228	187	.82	83	84
U. S. S. R., total	1,421	1,134	.80	100	100
Industrial machinery	1,349	1,095	.81	95	97
Machine tools for working metal, wood, stone, etc	1,047	943	.90	74	83
Total, principal commodity groups	1,349	1,095	.81	95	97
United States, total[1]	515	397	.77	100	100
Musical instruments (music boxes, barrel organs, etc.)	180	175	.97	35	44
Chemical specialties (powders for laundry purpose)	116	65	.56	23	16
Industrial machinery	85	70	.82	16	18
Rayon, nylon, and other synthetic textiles	54	29	.54	10	7
Total, principal commodity groups	435	339	.78	84	85
$1 AND OVER PER POUND					
All areas, total	13,281	51,390	3.87	100	100
Cotton manufactures	3,202	5,030	1.57	24	10
Coal-tar products	2,666	3,635	1.36	20	7
Medicinals and pharmaceutical preparations	1,258	3,357	2.67	10	7
Clocks and watches	1,047	24,533	23.42	8	48
Firearms, ammunition, and fireworks	926	5,867	6.33	7	11
Miscellaneous textile products	722	1,066	1.48	5	2
Total, principal commodity groups	9,821	43,488	4.43	74	85
$1 AND OVER PER POUND—Continued					
North America, total	4,270	17,161	$4.02	100	100
Coal-tar products	1,391	1,796	1.29	33	11
Colors from aniline, anthracene, etc	1,369	1,773	1.29	32	10
Cotton manufactures	815	1,423	1.75	19	8
Fabrics	524	830	1.58	12	5
Embroideries and laces	197	396	2.01	4	2
Miscellaneous textile products	459	644	1.40	11	4
Hats, etc., of straw, osier, etc	440	598	1.36	10	3
Clocks and watches	353	10,139	28.70	8	59
Finished watch movements	268	7,315	27.26	6	43
Total, principal commodity groups	3,018	14,002	4.64	71	82
Middle America, total	1,010	3,494	3.46	100	100
Medicinal and pharmaceutical preparations	262	625	2.39	26	18
Cotton manufactures	218	434	1.99	22	12
Fabrics	146	273	1.86	14	8
Embroideries	66	152	2.31	7	4
Coal-tar products (colors from aniline, anthracene, etc.)	154	232	1.50	15	7
Cotton semimanufactures (yarn)	78	91	1.17	8	2
Clocks and watches	72	1,596	22.19	7	46
Total, principal commodity groups	784	2,978	3.80	78	85
South America, total	2,180	9,209	4.22	100	100
Cotton manufactures	422	821	1.94	19	9
Fabrics	326	556	1.71	15	6
Coal-tar products (colors from aniline, anthracene, etc.)	362	503	1.39	17	5
Medicinal and pharmaceutical preparations	343	1,279	3.72	16	14
Firearms, ammunition, and fireworks	322	1,171	3.64	15	13
Arms, finished	260	872	3.35	12	9
Clocks and watches	156	4,005	25.64	7	43
Total, principal commodity groups	1,605	7,779	4.85	74	84
Africa, total	493	2,302	4.67	100	100
Rayon, nylon and other synthetic textiles	83	192	2.31	17	8
Artificial silk fabrics	55	79	1.42	11	3
Cotton manufactures	73	128	1.76	15	6
Embroideries	40	58	1.45	8	3
Fabrics	19	37	1.93	4	2
Clocks and watches	62	1,401	22.56	12	61
Leather manufactures (boots, shoes, etc.)	53	101	1.91	11	4
Office appliances (chiefly typewriters and parts)	38	53	1.42	8	2
Silk and manufactures	35	84	2.41	7	4
Total, principal commodity groups	344	1,959	5.69	70	85
Asia, total	4,000	14,736	3.68	100	100
Cotton manufactures	1,353	1,747	1.29	34	12
Embroideries and laces	853	1,013	1.19	21	7
Fabrics	441	639	1.45	11	4
Coal-tar products	699	923	1.32	17	6
Colors from aniline, anthracene, etc	615	837	1.36	15	6
Firearms, ammunition, and fireworks	601	4,661	7.76	15	32
Ammunition for portable firearms	423	2,932	6.93	11	20
Clocks and watches	299	5,152	17.22	8	35
Total, principal commodity groups	2,952	12,483	4.23	74	85
Oceania, total	1,096	3,613	3.30	100	100
Cotton manufactures	320	478	1.49	29	13
Embroideries and laces	242	326	1.35	22	9
Fabrics	68	121	1.80	6	3
Rayon, nylon, and other synthetic textiles	290	490	1.69	26	14
Artificial silk fabrics	238	327	1.37	22	9
Electrical machinery	116	157	1.35	11	4
Electric meters	102	133	1.31	9	4
Clocks and watches (watch movements 50 percent)	100	1,968	19.68	9	55
Total, principal commodity groups	826	3,093	3.74	75	86

[1] Included in North America.

Digitized by Google

TABLE 6.—*Principal Selected Swiss Exports by Value-per-Pound Ranges and Regions, 1938—Continued*

[Shipping weight in thousands of pounds; value in thousands of dollars.]

Principal selected exports	Shipping weight	Value	Value per pound	Percent of area total	
				Quantity	Value
$1 AND OVER PER POUND —Continued					
U. S. S. R., total	231	875	$3.78	100	100
Industrial machinery	97	159	1.64	42	18
Stationary steam engines, etc.	84	113	1.34	36	13
Soap and toilet preparations	43	92	2.15	19	11
Coal-tar products (colors from aniline, anthracene, etc.)	29	143	4.99	13	16
Iron and steel advanced manufactures	22	67	3.11	9	8
Clocks and watches	5	273	56.95	2	31
Total, principal commodity groups	196	734	3.74	85	84
$1 AND OVER PER POUND —Continued					
United States, total[1]	3,811	15,083	$3.96	100	100
Coal-tar products	1,391	1,796	1.29	36	12
Colors from aniline, anthracene, etc.	1,369	1,773	1.29	36	12
Cotton manufactures	670	1,181	1.76	18	8
Fabrics	486	782	1.61	13	5
Embroideries	112	249	2.22	3	2
Miscellaneous textile products	385	503	1.30	10	3
Hats, etc., of straw, osier, etc.	371	470	1.27	10	3
Clocks and watches	300	8,884	29.66	8	59
Finished watch movements	234	6,391	27.36	6	42
Total, principal commodity groups	2,746	12,364	4.50	72	82

[1] Included in North America.

Import Air-Cargo Potentials

Principal Import Commodity Groups

The same procedure used in the analysis of principal commodity groups in air-cargo export potentials was utilized in the consideration of Swiss air-cargo import potentials. The commodity groups accounting for one-half of the 28,000,000 pounds and $15,000,000 of Swiss imports averaging 25 cents a pound or more in value were segregated and analyzed by trade regions. For a more detailed analysis, the selected import commodity groups averaging 25 cents per pound or more which accounted for 75 percent of both the tonnage and value of selected Swiss imports were segregated by the 3 value-per-pound ranges and 7 non-European trade areas.

Table 7 shows that unmanufactured wool; nonferrous ores, metals and alloys; industrial machinery; and table beverages (chiefly tea) comprised more than one-half of the tonnage of selected Swiss imports in 1938. Unmanufactured wool alone contributed more than 8,000,000 pounds or approximately 30 percent of the total weight of Swiss imports averaging 25 cents per pound or more in value. This commodity, which originates principally in Oceania, does not appear particularly suitable for air cargo, considering the great distances shipments would move and the low value of 29 cents per pound.

Of the other commodities listed, only industrial machinery seems to offer a bright prospect for air transportation. The remaining commodities are so low in average value per pound as not to warrant the high cost of air transportation. Speed of transport, furthermore, is not a primary consideration in the case of nonferrous ores, metals, and alloys; and table beverages. How-

TABLE 7.—*Principal Commodity Groups of Selected Swiss Imports on Bases of Total Weight and Value, by Non-European Regions, 1938*

[Shipping weight in thousands of pounds; value in thousands of dollars.]

Principal import commodity groups on basis of total weight		Principal import commodity groups on basis of total value	
Commodity group	Shipping weight	Commodity group	Value
All areas, total	27,880	All areas, total	14,505
Wool, unmanufactured	8,254	Wool, unmanufactured	2,364
Nonferrous ores, metals, and alloys, except precious [1]	2,582	Silk and manufactures	1,553
Industrial machinery	2,466	Industrial machinery	1,314
Table beverages (chiefly tea)	1,988	Nonferrous ores, metals, and alloys, except precious (chiefly tin in pigs, bars, and slabs)	1,080
North America, total	9,183	North America, total	5,789
Industrial machinery	2,460	Industrial machinery	1,311
Automobiles and other vehicles	1,677	Office appliances	616
Rubber manufactures (chiefly hose and tubes)	1,342	Automobiles and other vehicles	597
		Leather	459
Middle America, total	106	Middle America, total	117
Vegetable oils (essential)	74	Tobacco and manufactures (cigars)	41
Miscellaneous, n.e.s. (sponges)	23	Vegetable oils (essential)	38
Tobacco and manufactures (cigars)	6		
South America, total	1,524	South America, total	512
"Other" edible animal products (meat extracts)	626	"Other" edible animal products (meat extracts)	162
Hair and manufactures (chiefly horse and buffalo hair, raw)	399	Hair and manufactures (chiefly horse and buffalo hair, raw)	129
Wool, unmanufactured (raw, scoured, etc.)	282	Wool, unmanufactured	86
Africa, total	1,004	Africa, total	325
Wool, unmanufactured	860	Wool, unmanufactured	236
Vegetable oils (chiefly essential oils)	104		
Asia, total	8,774	Asia, total	5,270
Nonferrous ores, metals, and alloys, except precious [1]	2,385	Silk and manufactures	1,448
Table beverages (tea)	1,969	Nonferrous ores, metals, and alloys, except precious (chiefly tin in pigs, bars, and slabs)	967
Silk and manufactures	1,131	Table beverages (tea)	682
Oceania, total	7,133	Oceania, total	2,058
Wool, unmanufactured	7,112	Wool, unmanufactured	2,043
U. S. S. R., total	156	U. S. S. R., total	434
Hair and manufactures (chiefly horse and buffalo hair, raw)	75	Precious metals and plated ware, except jewelry, bullion, and coin (platinum, unwrought)	261
Fruits and preparations (preserves and delicacies)	21		
United States, total [2]	8,711	United States, total [2]	5,513
Industrial machinery	2,440	Industrial machinery	1,301
Automobiles and other vehicles	1,670	Office appliances	616
Rubber and manufactures (chiefly hose and tubes	1,108	Automobiles and other vehicles	590
		Leather	442

[1] Chiefly tin in bars, pigs, and slabs.
[2] Included in North America.

Digitized by Google

ever, relatively low-valued goods may move by air as back-haul cargo to provide a pay load for empty planes.

It will be noted that in the case of imports, each of the principal commodity groups originate chiefly in only one trading area. For example, North America, and the United States in particular, supplied almost all of the industrial machinery imported by Switzerland in 1938, whereas Asia supplied the tea and silk.

When dollar value is used as the basis for selecting the principal commodity groups averaging 25 cents or more per pound, silk and manufactures replace table beverages in the list of commodity groups that account for more than one-half of selected Swiss imports by weight. Raw silk, because of its high value per pound and the consequent large amount of funds tied up in individual shipments, and silk manufactures, particularly style goods the value of which depends to a considerable extent on prompt delivery, are well suited to air transportation.

Table 7 shows that unmanufactured wool ranked highest among the total principal Swiss imports on the basis of total dollar value as well as tonnage in spite of that commodity's low average value per pound. Industrial machinery, and nonferrous metals and alloys, also rank high on the bases of both tonnage and value.

Principal Imports by Value per Pound

Arrangement of the principal selected Swiss imports from each region in order of magnitude of pounds in each value-per-pound range facilitates evaluation. Table 8 lists the commodity groups in each value-per-pound range which accounted for 75 percent or more of the shipping weight and dollar value of the selected imports from each area.

Unmanufactured wool, nonferrous metals and alloys, table beverages (chiefly tea), automobiles and other vehicles, rubber and manufactures, and industrial machinery comprise 78 and 77 percent of the shipping weight and dollar value, respectively, of total Swiss imports in 1938 with an average value of 25 cents to 49 cents per pound. Of these commodities, only industrial machinery and parts thereof, a considerable volume of which originates in the United States, appear attractive for shipment by air.

An examination of the commodity groups listed in the 50-cents to 99-cents-per-pound range reveals that industrial machinery, silk and manufactures, and cotton manufactures comprise 60 and 57 percent of the tonnage and dollar value of selected Swiss imports from all areas. The prospect of transporting commodities in this value group by air would seem more favorable than in the case of those comprising the lowest value group. This is particularly true of medicinal and pharmaceutical preparations from the United States.

Silk and manufactures, office appliances, and leather accounted for approximately one-half of the shipping weight of selected Swiss imports in the $1 or more per pound range. Electrical machinery and apparatus; photographic and projection goods; rayon, nylon, and other synthetic textiles; miscellaneous textile products; iron and steel advanced manufactures; and industrial machinery also appear as principal selected imports in this value range. With the exception of miscellaneous textile products, all these commodity groups have an average value of less than $2.50 per pound.

Cigars from Middle America, medicinal and pharmaceutical preparations from South America, and precious metals and plated ware from the U. S. S. R. are commodities which appear particularly suitable for movement by air because of their relatively high value per pound. These commodities, however, account for only a very small percentage of the total shipping weight of the principal selected imports in the $1 and more value range. Radio apparatus, photographic and projection goods, and typewriter and cash-register parts appear to have distinct possibilities for air shipment from the United States to Switzerland. In 1938 these commodities moved in substantial quantities from the standpoint of potential air transport.

TABLE 8.—*Principal Selected Swiss Imports by Value-per-Pound Ranges and Regions, 1938*

[Shipping weight in thousands of pounds; value in thousands of dollars.]

Principal selected imports	Shipping weight	Value	Value per pound	Percent of area total	
				Quantity	Value
25 CENTS TO 49 CENTS PER POUND					
All areas, total	21,055	6,891	$0.33	100	100
Wool, unmanufactured	8,254	2,364	.29	39	34
Nonferrous metals and alloys, except precious	2,535	1,024	.40	12	15
Table beverages (chiefly tea)	1,976	682	.34	9	10
Automobiles and other vehicles	1,655	578	.35	8	8
Rubber and manufactures (chiefly hose and tubes)	1,216	341	.28	6	5
Industrial machinery	782	338	.43	4	5
Total, principal commodity groups	16,418	5,327	.32	78	77
North America, total	5,167	1,811	.35	100	100
Automobiles and other vehicles	1,655	578	.35	32	32
Automobiles and chassis, etc.	1,624	568	.35	31	31
Rubber and manufactures	1,190	330	.28	23	18
Hose and tubes	1,112	308	.28	22	17
Industrial machinery	778	337	.43	15	19
Refrigerating machinery	155	76	.49	3	4
Printing and bookbinding machinery (printing presses)	253	97	.38	5	5
Total, principal commodity groups	3,876	1,342	.35	75	74
Middle America, total	51	14	.28	100	100
Vegetable oils (essential)	50	14	.27	98	100
25 CENTS TO 49 CENTS PER POUND—Continued					
South America, total	1,449	420	$0.29	100	100
"Other" edible animal products (meat extracts)	626	162	.26	43	39
Hair and manufactures (horse and buffalo hair, raw)	398	128	.32	28	30
Wool, unmanufactured (raw, scoured, dyed)	282	86	.30	19	20
Leather (sole leather, butts)	134	41	.31	9	10
Total, principal commodity groups	1,440	417	.29	99	99
Africa, total	883	243	.28	100	100
Wool, unmanufactured (raw, scoured, dyed)	860	236	.27	97	97
Asia, total	6,285	2,323	.37	100	100
Nonferrous ores, metals, etc.	2,384	967	.41	38	42
Tin in bars, pigs, slabs, etc.	2,382	966	.41	38	42
Table beverages (tea)	1,956	676	.35	31	29
Vegetables and preparations (soups)	651	213	.33	10	9
Vegetable oils	548	203	.37	9	9
Essential oils	546	202	.37	9	9
Total, principal commodity groups	5,539	2,059	.37	88	89
Oceania, total	7,128	2,048	.29	100	100
Wool, unmanufactured (raw, scoured, dyed)	7,112	2,043	.29	100	100

Digitized by Google

TABLE 8.—*Principal Selected Swiss Imports by Value-per-Pound Ranges and Regions, 1938—Continued*

[Shipping weight in thousands of pounds; value in thousands of dollars.]

Principal selected imports	Shipping weight	Value	Value per pound	Percent of area total	
				Quantity	Value
25 CENTS TO 49 CENTS PER POUND—Continued					
U. S. S. R., total	92	32	$0.35	100	100
Hair and manufactures (horse and buffalo hair, raw)	67	22	.33	73	69
Vegetable fibers and manufactures (fabrics of flax)	16	7	.42	17	22
Total, principal commodity groups	83	29	.35	90	91
United States, total[1]	4,781	1,689	.35	100	100
Automobiles and other vehicles	1,655	578	.35	35	34
Automobiles and chassis, etc.	1,624	568	.35	34	34
Rubber and manufactures	958	265	.28	20	16
Hose and tubes	880	243	.28	18	14
Industrial machinery	767	331	.43	16	19
Refrigerating machinery	155	76	.49	3	4
Printing and bookbinding machinery (printing presses)	253	97	.38	5	6
Books, maps, pictures, etc.	156	46	.30	3	3
Paper, printed or lithographed	124	36	.29	3	2
Total, principal commodity groups	3,789	1,317	.35	79	78
50 CENTS TO 99 CENTS PER POUND					
All areas, total	4,237	2,679	.63	100	100
Industrial machinery	1,642	904	.55	39	34
Silk and manufactures	468	349	.75	11	13
Cotton manufactures	449	282	.63	11	10
Rubber and manufactures	151	101	.66	4	4
Vegetable oils	145	92	.63	3	3
Iron and steel advanced manufactures	145	79	.54	3	3
Hair and manufactures	105	76	.72	2	3
Leather	65	45	.68	2	2
Total, principal commodity groups	3,170	1,928	.61	75	72
North America, total	2,758	1,652	.60	100	100
Industrial machinery	1,640	903	.55	60	54
Machine tools for working metal, wood, etc.	1,495	818	.55	54	50
Machinery for manufacture of foodstuffs	111	62	.56	4	4
Rubber and manufactures	151	101	.66	5	6
Iron and steel advanced manufactures	145	79	.54	5	5
Medicinal and pharmaceutical preparations	141	80	.57	5	5
Total, principal commodity groups	2,077	1,163	.56	75	70
Middle America, total	15	13	.90	100	100
Vegetable oils (essential)	13	12	.91	87	92
South America, total	35	22	.63	100	100
Leather	28	17	.61	80	77
Vegetable oils (essential)	4	3	.77	11	14
Total, principal commodity groups	32	20	.63	91	91
Africa, total	118	72	.61	100	100
Vegetable oils (essential)	102	62	.61	86	86
Asia, total	1,289	908	.70	100	100
Silk and manufactures	468	349	.75	36	38
Combed floss silk	332	281	.85	26	31
Silk waste and defective cocoons	136	68	.50	11	7
Cotton manufactures	442	277	.63	34	31
Fabrics	440	276	.63	34	30
Miscellaneous, n. e. s.	135	105	.78	11	12
Small wares of glass, clay, etc.	119	94	.79	9	10
Total, principal commodity groups	1,045	731	.70	81	81
50 CENTS TO 99 CENTS PER POUND—Continued					
Oceania, total	3	2	$0.54	100	100
Vegetables oils (essential)	3	2	.54	100	100
U. S. S. R., total	19	11	.55	100	100
Medicinal and pharmaceutical preparations	12	7	.56	63	64
Vegetable oils	7	4	.55	37	36
Total, principal commodity groups	19	11	.58	100	100
United States, total[1]	2,695	1,617	.60	100	100
Industrial machinery	1,632	898	.55	61	56
Machine tools for working metal, etc.	1,495	818	.55	56	51
Machinery for manufacture of foodstuffs	111	62	.56	4	4
Rubber and manufactures	151	100	.66	6	6
Iron and steel advanced manufactures	145	79	.54	5	5
Medicinal and pharmaceutical preparations	141	80	.57	5	5
Tobacco and manufactures	121	106	.88	4	6
Cigarettes	117	104	.89	4	6
Soap and toilet preparations	102	65	.64	4	4
Total, principal commodity groups	2,292	1,328	.58	85	82
$1 AND OVER PER POUND					
All areas, total	2,588	4,935	1.91	100	100
Silk and manufactures	676	1,158	1.71	26	23
Office appliances	371	617	1.66	14	13
Leather	235	403	1.72	9	8
Electrical machinery and apparatus	171	230	1.35	7	5
Photographic and projection goods	146	296	2.03	6	6
Rayon, nylon, and other synthetic textiles	133	292	2.19	5	6
Miscellaneous textile products	53	168	3.18	2	3
Iron and steel advanced manufactures	52	125	2.40	2	3
Industrial machinery	42	72	1.72	2	1
Total, principal commodity groups	1,879	3,361	1.79	73	68
North America, total	1,258	2,327	1.85	100	100
Office appliances	371	616	1.66	29	27
Typewriters and parts	224	309	1.38	18	13
Cash registers, accounting machines and parts	102	169	1.65	8	7
Leather	235	403	1.72	19	17
Electrical machinery and apparatus	168	227	1.35	13	10
Radio apparatus	151	188	1.24	12	8
Photographic and projection goods	146	296	2.03	12	13
Photographic dry plates of polished glass	119	193	1.62	9	8
Iron and steel advanced manufactures	52	125	2.40	4	5
Total, principal commodity groups	972	1,667	1.72	77	72
Middle America, total	41	90	2.20	100	100
Miscellaneous, n. e. s. (sponges)	23	32	1.41	56	36
Vegetable oils (essential)	12	13	1.14	29	14
Tobacco and manufactures (cigars)	6	41	6.41	15	46
Total, principal commodity groups	41	86	2.10	100	96
South America, total	40	70	1.74	100	100
Tobacco and manufactures (cigars)	18	25	1.44	45	36
Vegetable oils (essential)	13	13	1.02	33	18
Hides and skins, raw, except furs (calf, kip, and sheep skins)	7	11	1.53	18	16
Medicinal and pharmaceutical preparations	1	11	11.25	2	16
Total, principal commodity groups	39	60	1.54	98	

[1]Included in North America.

Digitized by Google

TABLE 8.—*Principal Selected Swiss Imports by Value-per-Pound Ranges and Regions, 1938—Continued*

[Shipping weight in thousands of pounds: value in thousands of dollars.]

Principal selected imports	Shipping weight	Value	Value per pound	Percent of area total	
				Quantity	Value
$1 AND OVER PER POUND —Continued					
Africa, total	2	10	$3.84	100	100
Vegetable oils	2	4	1.65	67	40
Clocks and watches	[1]	4	35.74	[2]	40
Total, principal commodity groups	2	8	4.00	67	80
Asia, total	1,200	2,039	1.70	100	100
Silk and manufactures	663	1,099	1.66	55	54
Raw silk, unbleached, not thrown	638	1,052	1.65	53	52
Wool manufactures	269	293	1.09	23	14
Carpets and rugs	269	293	1.09	23	14
Total, principal commodity groups	932	1,392	1.49	78	68
Oceania, total	2	8	5.44	100	100
Toys, athletic and sporting goods (toys)	1	2	3.06	50	25
"Other" nonmetallic minerals, including precious (precious and semiprecious and synthetic stones of all kinds, not set)	1	2	3.18	50	25
Clocks and watches	[3]	4	30.36	[2]	50
Total, principal commodity groups	2	8	4.00	100	100
$1 AND OVER PER POUND —Continued					
U. S. S. R., total	45	391	$8.81	100	100
Fruits and preparations (preserves and delicacies)	21	88	4.16	47	22
Wool manufactures (carpets and rugs)	11	24	2.16	24	6
Hair and manufactures	8	12	1.48	18	3
Precious metals, and plated ware, except jewelry, bullion, and coin (platinum, unwrought)	2	261	127.44	4	67
Total, principal commodity groups	42	385	9.17	93	98
United States, total[4]	1,235	2,207	1.79	100	100
Office appliances	371	616	1.66	30	28
Typewriters and parts	224	309	1.38	18	14
Cash registers, accounting machines, and parts	102	169	1.65	8	8
Leather	230	386	1.68	19	18
Electrical machinery and apparatus	168	227	1.35	13	10
Radio apparatus	151	188	1.24	12	9
Photographic and projection goods	146	296	2.03	12	14
Photographic dry plates of polished glass	119	193	1.62	10	9
Iron and steel advanced manufactures	47	98	2.08	4	4
Total, principal commodity groups	962	1,623	1.69	78	74

[1] 106 pounds.
[2] Neglible.
[3] 126 pounds.
[4] Included in North America.

Conclusion

The shipping weight of commodity groups having an average value of 25 cents per pound or more exported by Switzerland to all non-European trade areas totaled 45,000,000 pounds in 1938. This volume of selected exports in weight was more than 1½ times the 28,000,000 pounds of selected imports. An even greater difference becomes apparent when the dollar value of the commodity groups is considered, for the value of all exports selected as air-cargo potentials totaled nearly $65,000,000, a sum about 4½ times the $15,000,000 total of selected Swiss imports. The average value per pound of selected exports to all areas was $1.43 as compared with the much lower average value per pound of $0.52 for selected imports.

Some differences may be noted in the characteristics of the individual commodities listed as principal exports and those listed as principal imports. Commodity groups of selected Swiss exports include for the most part manufactured goods and finished products such as machinery and textiles, whereas the selected imports include similar finished products as well as unmanufactured commodities such as wool, and nonferrous ores, metals, and alloys.

As applied to air-cargo transportation, the unbalanced trade situation between Switzerland and the non-European trade areas suggests that a return-haul problem will have to be faced in developing air trade. Some adjustment in rates into Switzerland might be made so that a sufficient quantity of the lower-valued Swiss imports could be carried to insure economical utilization of aircraft. This problem may be especially difficult in the case of Africa and Oceania which show unmanufactured wool as their principal contribution to Swiss foreign trade.

The prospect of developing air-cargo movement between Switzerland and the United States appears to be much more encouraging than for most areas. Swiss exports to the United States are approximately equal in tonnage to Swiss imports from the United States. Of even greater significance is the fact that the list of commodity groups with an average value of $1 or more per pound accounts for a relatively large percentage of the tonnage volume of selected commodities exchanged between these two countries. These commodity groups present a fairly wide selection of individual commodities from which air cargo may be drawn.

This report is the first of a series on European countries; when the trade data of the remaining 10 countries are presented, the balance of trade in high-valued goods for the whole of the Greater European area will be indicated.

Digitized by Google

TABLE 9.—*Switzerland: Summary of Selected Exports [1] and Selected Imports [1] by Regions and Value-per-Pound Ranges, 1938*

[Shipping weight in pounds; value in dollars.]

Region	Total			25 cents to 49 cents per pound			50 cents to 99 cents per pound			$1.00 and over per pound		
	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound
Selected exports [1], total	45,332,362	64,828,694	$1.43	25,027,423	7,963,064	$0.32	7,023,841	5,475,550	$0.78	13,281,098	51,390,080	$3.87
Selected exports to:												
North America	9,979,878	19,687,065	1.97	4,612,960	1,583,909	.34	1,097,162	941,821	.86	4,269,756	17,161,335	4.02
Middle America	4,055,669	4,518,509	1.11	2,866,065	896,120	.31	179,400	128,296	.72	1,010,204	3,494,093	3.46
South America	10,048,436	12,084,022	1.20	6,811,382	2,136,395	.31	1,056,710	738,933	.70	2,180,344	9,208,694	4.22
Africa	3,752,362	3,662,818	.98	2,563,933	827,467	.32	695,513	532,874	.77	492,916	2,302,477	4.67
Asia	12,283,965	18,356,472	1.49	5,983,677	1,843,409	.31	2,299,936	1,777,377	.77	4,000,352	14,735,686	3.68
Oceania	3,048,279	4,337,498	1.42	1,677,486	502,496	.30	274,612	222,158	.81	1,096,181	3,612,844	3.30
U. S. S. R.	2,163,773	2,182,310	1.01	511,920	173,268	.34	1,420,508	1,134,091	.80	231,345	874,951	3.78
United States [2]	7,640,962	16,649,030	2.18	3,314,545	1,168,563	.35	515,487	397,411	.77	3,810,930	15,083,056	3.96
Selected imports [1], total	27,879,772	14,505,373	.52	21,055,475	6,891,471	.33	4,236,490	2,679,322	.63	2,587,807	4,934,580	1.91
Selected imports from:												
North America	9,183,021	5,789,294	.63	5,167,432	1,810,915	.35	2,757,359	1,651,664	.60	1,258,230	2,326,715	1.85
Middle America	106,428	117,272	1.10	50,899	14,199	.28	14,601	13,116	.90	40,928	89,957	2.20
South America	1,523,835	512,214	.34	1,448,804	420,397	.29	34,949	22,094	.63	40,082	69,723	1.74
Africa	1,003,607	324,777	.32	883,125	243,030	.28	117,974	72,117	.61	2,508	9,630	3.84
Asia	8,774,457	5,270,165	.60	6,285,170	2,322,756	.37	1,289,061	907,882	.70	1,200,226	2,039,527	1.70
Oceania	7,132,515	2,057,735	.29	7,127,738	2,047,979	.29	3,312	1,788	.54	1,465	7,968	5.44
U. S. S. R.	155,909	433,916	2.78	92,307	32,195	.35	19,234	10,661	.55	44,368	391,060	8.81
United States [2]	8,710,933	5,512,583	.63	4,780,756	1,688,453	.35	2,695,343	1,617,015	.60	1,234,834	2,207,115	1.79

Note: The following factors were used for conversion of Switzerland's original data, which were expressed in kilograms (net) and Swiss francs, to pounds and United States dollars: One kilogram = 2.2046 pounds; one Swiss franc = $0.2287 (1938 exchange rate).

[1] The commodities included in this report were chosen on a price per pound basis. Only commodities for which total export or import trade averaged 25 cents or more per pound (shipping weight) were used. Trade with individual non-European countries in these selected commodities was excluded when the country's average fell below this price.

[2] Included in North America.

TABLE 10.—*Switzerland: Summary of Selected Exports [1] by Regions and Commodity Groups, 1938*

[In pounds, shipping weight]

Commodity group	Total non-European Regions	North America	Middle America	South America	Africa	Asia	Oceania	U. S. S. R.	United States [2]
Selected exports [1], total	45,332,362	9,979,878	4,055,669	10,048,436	3,752,362	12,283,965	3,048,279	2,163,773	7,640,962
Meat products	2,742	761		1,662		217	102		761
"Other" edible animal products	254,353	126,191	20,954	13,073	2,978	88,817	2,340		122,936
Leather	22,855	11,645			3,682	7,528			11,594
Leather manufactures	246,410	126,955	754	5,709	53,153	42,939	16,900		105,090
Furs and manufactures	332	217		115					217
"Other" inedible animals and animal products	1,345	1,171	58	58		58			1,171
Fruits and preparations	69,987		22,463	45,653			1,871		
Table beverages	244,499	96,933	30,848	21,260	49,285	14,581	31,592		63,587
Spices	23					23			
Sugar and related products	61,978	15,779			4,436	41,763			15,779
Beverages, n. e. s.	15,727	7,932		7,795					7,932
Rubber and manufactures	97,817	8,438	42,434	30,770	7,695	5,858	2,622		2,697
Drugs, herbs, leaves, and roots, crude	128,458	3,193		42		125,223			3,193
Vegetable oils	9,599	355	15	5,175	9	4,045			355
Vegetable dyeing and tanning extracts	6,900	1,808		707	858	2,578	949		1,808
Seeds, except oilseeds	1,976	309					1,667		309
Tobacco and manufactures	176	93		27		56			93
Miscellaneous vegetable products	110,349	19,960	19,643	29,802		40,944			19,960
Cotton semimanufactures	480,045	15,105	77,871	324,904	11,682	50,483			15,105
Cotton manufactures	3,867,868	830,365	219,988	429,548	657,108	1,411,060	319,799		678,448
Vegetable fibers and manufactures	150,372	120,287	2,271	4,864	1,277	18,223	3,450		115,090
Wool unmanufactured	95			95					
Wool semimanufactures	56,473	5,220		49,444	1,809				5,220
Wool manufactures	85,577	40,036	4,987	18,211	15,526	4,510	2,195	112	30,463
Silk and manufactures	154,426	43,176	844	28,441	34,861	26,198	20,906		27,004
Rayon, nylon, and other synthetic textiles	1,466,152	201,380	275,213	589,812	86,574	17,895	295,278		130,252
Miscellaneous textile products	754,974	483,107	35,678	99,664	23,217	6,606	106,702		408,973
Wood manufactures	19,587	12,559			1,199	1,596	4,233		11,593
Cork and manufactures	76	76							76
Paper, related products and manufactures	40,568	3,269	3,048	4,921		29,330			3,269
Glass and glass products	24,179	3,891	3,029	15,536		1,723			1,665
Clay and clay products	7,563	1,113	3,679	1,975		796			1,113
"Other" nonmetallic minerals, including precious	150,499	2,714	51	11,513	7,709	110,779	11,578	6,155	2,681
Steel mill manufactures	587,228	2,386	1,729	523,949	28,277	14,457	16,430		2,386
Iron and steel advanced manufactures	119,828	36,387	2,526	27,385	9,995	15,847	6,047	21,641	34,728
Nonferrous ores, metals, and alloys, except precious	5,284,265	2,430,101	707,890	864,624	459,714	592,347	218,221	11,368	2,327,435
Precious metals and plated ware, except jewelry, bullion, and coin	2,645	526		476	1,220	423			526
Electrical machinery and apparatus	6,951,396	1,056,084	855,695	2,430,020	379,327	1,056,672	1,097,166	76,432	49,970
Industrial machinery	12,690,785	915,363	646,782	2,248,031	1,646,466	4,704,862	571,666	1,957,615	775,936
Office appliances	306,653	85,047	34,617	85,404	37,568	48,475	15,542		73,049
Printing and bookbinding machinery	291,104	7,810	4,081	271,752		5,143	2,318		5,644
Agricultural machinery and implements	7,712	6,663					1,049		6,617
Automobiles and other vehicles	353,015	214	176,577	150,706	9,518	10,943	4,688	369	214
Coal-tar products	3,949,923	1,943,214	160,834	477,796	30,541	1,202,627	106,184	28,727	1,405,816
Medicinal and pharmaceutical preparations	2,123,677	116,796	524,841	502,439	100,234	861,562	17,803	2	84,019
Chemical specialties	265,277	140,557	16,307	40,653		47,551	20,209		123,358
Industrial chemicals	83,923	34,266	19,953	22,529		5,887	1,288		32,741
Pigments, paints, and varnishes	48,521	11,483	1,722	4,329		30,987			1,516
Explosives, fuses, etc.	6,227					6,227			
Soap and toilet preparations	559,173	80,549	35,054	91,996	1,445	291,333	16,283	42,513	72,365
Photographic and projection goods	5,229	4,470		759					4,4

Digitized by Google

TABLE 10.—*Switzerland: Summary of Selected Exports [1] by Regions and Commodity Groups, 1938—Continued*

[In pounds, shipping weight]

Commodity group	Total non-European Regions	North America	Middle America	South America	Africa	Asia	Oceania	U. S. S. R.	United States [2]
Scientific and professional instruments, apparatus and supplies	102,760	7,945	4,116	27,529	8,318	36,233	8,255	10,364	7,690
Musical instruments	869,648	490,206	1,880	20,123	10,237	326,210	17,792	3,200	481,979
Miscellaneous office supplies	11,023	401	3,095	5,311		2,216			401
Toys, athletic and sporting goods	1,020	804				187	29		624
Firearms, ammunition, and fireworks	926,417	637	3,035	321,829		600,916			637
Books, maps, pictures, and other printed matter	89,288	28,522	3,244	9,500	1,977	46,045			28,522
Clocks and watches	1,068,697	353,321	71,911	157,872	62,102	318,716	99,983	4,792	299,506
Art works	45,350	20,742	14,590	7,650			1,885	483	17,077
Jewelry	1,613	186	248	212		967			186
Miscellaneous, n. e. s.	45,985	21,160	1,114	14,786	2,365	3,303	3,257		15,116

Note: The following factors were used for conversion of Switzerland's original data, which were expressed in kilograms (net) and Swiss francs, to pounds and United States dollars: One kilogram = 2.2046 pounds; one Swiss franc = $0.2287 (1938 exchange rate).

[1] The commodities included in this report were chosen on a price-per-pound basis. Only commodities for which total export or import trade averaged 25 cents or more per pound (shipping weight) were used. Trade with individual non-European countries in these selected commodities was excluded when the country's average fell below this value.

[2] Included in North America.

TABLE 11.—*Switzerland: Summary of Selected Imports [1] by Regions and Commodity Groups, 1938*

[In pounds, shipping weight]

Commodity group	Total non-European Regions	North America	Middle America	South America	Africa	Asia	Oceania	U. S. S. R.	United States [2]
Selected imports [1], total	27,879,772	9,183,021	106,428	1,523,835	1,003,607	8,774,457	7,132,515	155,909	8,710,933
Meat products	54,518	54,518							
"Other" edible animal products	663,055			625,556		37,499			
Hides and skins, raw, except furs	38,233	14,765		7,382	10,173	5,856		57	13,436
Leather	509,939	340,169		161,662		8,108			335,241
Leather manufactures	21,285	21,237		15	3	27	3		21,080
Furs and manufactures	5,077	3,429				162		1,486	1,235
"Other" inedible animals and animal products	4,984	2,195				2,789			2,195
Vegetables and preparations	651,086					651,086			
Fruits and preparations	21,245		5	19		121	9	21,091	
Table beverages	1,988,178	1,501			17,967	1,968,710			1,501
Sugar and related products	15,688	15,248		255	45	140			15,248
Beverages, N.E.S.	33	33							33
Rubber and manufactures	1,368,470	1,342,068				26,402			1,108,275
Drugs, herbs, leaves, and roots, crude	63,012	44,230	1,715	3,312		13,755			44,230
Vegetable oils	785,119		73,990	16,454	103,799	570,912	3,273	16,691	
Tobacco and manufactures	148,412	121,687	6,355	17,637		2,733			121,687
Cotton semimanufactures	5	5							5
Cotton manufactures	526,563	26,341		89	9	500,124			26,224
Vegetable fibers and manufactures	74,417	16,366			2,819	39,492		15,740	16,313
Wool, unmanufactured	8,253,731			281,936	859,589		7,112,206		
Wool semimanufactures	1,774	17					1,757		17
Wool manufactures	392,143	1,760		13	10	378,998	12	11,350	1,716
Hair and manufactures	599,168	49,489		399,314		61,678	13,728	74,959	5,813
Silk and manufactures	1,267,497	136,870				1,130,627			136,870
Rayon, nylon, and other synthetic textiles	333,999	3,123		5		330,871			2,758
Miscellaneous textile products	377,091	43,970	30	513	1,808	330,770			43,970
Wood manufactures	20,182	11,422			160	8,600			11,422
Cork and manufactures	6,001	6,001							6,001
Paper, related products and manufactures	27,244	24,207				3,037			24,207
Glass and glass products	25					25			
"Other" nonmetallic minerals, including precious	198,814	187,413		[3]	6,873	3,955	573		186,216
Iron and steel semimanufactures	6,609	6,609							6,609
Steel mill manufactures	92,892	92,892							92,892
Iron and steel advanced manufactures	281,751	279,960		5		1,778	8		274,808
Nonferrous ores, metals, and alloys, except precious	2,582,339	197,471		4		2,384,862	2		118,519
Precious metals and plated ware, except jewelry, bullion, and coin	9,256	7,202			3			2,051	7,202
Electrical machinery and apparatus	354,702	346,572	424	4,999	30	2,677			345,039
Industrial machinery	2,465,650	2,460,017	938	2,880	3	1,782	30		2,440,220
Office appliances	371,031	370,729			31	271			370,678
Printing and bookbinding machinery	292,236	292,236							292,236
Automobiles and other vehicles	1,676,976	1,676,976							1,670,083
Coal-tar products	133,010	132,701				309			132,701
Medicinal and pharmaceutical preparations	189,673	143,297	4	1,025	7	32,924		12,416	142,087
Industrial chemicals	6,957	5,864				1,093			5,864
Soap and toilet preparations	127,475	125,451	6	122		1,896			125,451
Photographic and projection goods	173,040	173,040							166,473
Scientific and professional instruments, apparatus and supplies	50,694	45,862	119	3	143	4,564	3		45,845
Musical instruments	31,522	31,012	34	34	13	423	6		31,006
Miscellaneous office supplies	67,425	65,500				1,925			65,500
Toys, athletic and sporting goods	167,196	49,280				117,178	738		39,852
Firearms, ammunition, and fireworks	500	484				16			484
Books, maps, pictures, and other printed matter	167,243	161,732		260		5,152	39	60	161,732
Clocks and watches	11,029	6,976	100	327	106	3,394	126		6,952
Art works	991	976	5				2	8	974
Jewelry	1,675	777				898			777
Miscellaneous, n. e. s.	200,912	41,341	22,703	14	16	136,838			41,256

Note: The following factors were used for conversion of Switzerland's original data, which were expressed in kilograms (net) and Swiss francs, to pounds and United States dollars: One kilogram = 2.2046 pounds; one Swiss franc = $0.2287 (1938 exchange rate).

[1] The commodities included in this report were chosen on a price-per-pound basis. Only commodities for which total export or import trade averaged 25 cents or more per pound (shipping weight) were used. Trade with individual non-European countries in these selected commodities was excluded when the country's average fell below this value.

[2] Included in North America.

[3] Less than one-half the unit.

Digitized by Google

TABLE 12.—*Switzerland: Selected Exports to North America by Commodity Groups and Value-per-Pound Ranges, 1938*

[Shipping weight in pounds; value in dollars.]

Commodity group	Total			25 cents to 49 cents per pound			50 cents to 99 cents per pound			$1.00 and over per pound		
	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound
North America, Switzerland's selected exports to, total	9,979,878	19,687,065	$1.97	4,612,960	1,583,909	$0.34	1,097,162	941,821	$0.86	4,269,756	17,161,335	$4.02
Meat products	761	851	1.12							761	851	1.12
"Other" edible animal products (meat extract preparations, solid or liquid)	126,191	35,299	.28	126,191	35,299	.28						
Leather	11,645	12,073	1.04	2,130	1,029	.48	1,934	1,604	.88	7,581	9,350	1.23
Leather manufactures	126,955	243,013	1.91				6,678	6,334	.95	120,277	236,679	1.97
Boots, shoes and slippers, of leather	122,630	235,189	1.92				6,678	6,334	.95	115,952	228,855	1.97
Furs and manufactures	217	481	2.22							217	481	2.22
"Other" inedible animals and animal products	1,171	2,439	2.08							1,171	2,439	2.08
Table beverages	96,933	27,431	.28	96,933	27,431	.28						
Chocolate	96,917	27,424	.28	96,917	27,424	.28						
Sugar and related products (confectionery and sweetmeats)	15,779	4,791	.30	15,779	4,791	.30						
Beverages, n. e. s. (brandy)	7,932	2,642	.33	7,932	2,642	.33						
Rubber and manufactures	8,438	7,364	.87	3,813	1,584	.42	294	180	.61	4,331	5,600	1.29
Drugs, herbs, leaves, and roots, crude	3,193	10,418	3.26							3,193	10,418	3.26
Vegetable oils (essential oils)	355	1,015	2.86							355	1,015	2.86
Vegetable dyeing and tanning extracts	1,808	497	.27	1,808	497	.27						
Seeds, except oilseeds	309	797	2.58							309	797	2.58
Tobacco and manufactures (cigars and cigarettes)	93	102	1.10				51	43	.84	42	59	1.40
Miscellaneous vegetable products (chiefly starch gum)	19,960	8,056	.40	19,960	8,056	.40						
Cotton semimanufactures (yarn)	15,105	6,461	.43	15,105	6,461	.43						
Cotton manufactures	830,365	1,435,187	1.73				14,930	11,747	.79	815,435	1,423,440	1.75
Fabrics	525,366	831,524	1.58				1,551	1,444	.93	523,815	830,080	1.58
Embroideries and laces	199,163	397,776	2.00				2,239	1,796	.80	196,924	395,980	2.01
Vegetable fibers and manufactures	120,287	241,312	2.01	56,702	17,872	.32	14,571	9,380	.64	49,014	214,060	4.37
Wool semimanufactures (yarn)	5,220	7,209	1.38							5,220	7,209	1.38
Wool manufactures	40,036	118,855	2.97							40,036	118,855	2.97
Silk and manufactures	43,176	412,206	9.55	757	293	.39				42,419	411,913	9.71
Rayon, nylon, and other synthetic textiles	201,380	399,719	1.98	20,690	8,450	.41	53,648	28,983	.54	127,042	362,286	2.85
Artificial silk fabrics	110,316	323,664	2.93							110,316	323,664	2.93
Miscellaneous textile products	483,107	655,768	1.36	21,357	9,526	.45	2,357	2,189	.93	459,393	644,053	1.40
Hats and other articles of straw, cane, etc., dyed and printed	439,926	598,224	1.36							439,926	598,224	1.36
Wood manufactures	12,559	20,168	1.61	2,793	953	.34				9,766	19,215	1.97
Cork and manufactures (soles)	76	49	.64				76	49	.64			
Paper, related products and manufactures	3,269	9,865	3.02	731	213	.29				2,538	9,652	3.80
Glass and glass products	3,891	3,519	.90	324	134	.41	2,633	1,877	.71	934	1,508	1.61
Clay and clay products	1,113	1,466	1.32							1,113	1,466	1.32
"Other" nonmetallic minerals, including precious	2,714	58,610	21.60	42	14	.33	665	431	.65	2,007	58,165	28.98
Steel mill manufactures	2,386	4,090	1.71				178	116	.65	2,208	3,974	1.80
Iron and steel advanced manufactures (chiefly files, rasps, and other tools and instruments)	36,387	105,924	2.91				1,147	721	.63	35,240	105,203	2.99
Nonferrous ores, metals, and alloys, except precious	2,430,101	852,925	.35	2,425,459	840,174	.35				4,642	12,751	2.75
Aluminum and alloys, hammered, in bars, sheets, pipes, and wire; and stamped washers	91,705	41,943	.46	91,705	41,943	.46						
Goods of aluminum for other than industrial and construction uses	2,331,637	797,530	.34	2,331,637	797,530	.34						
Precious metals and plated ware, except jewelry, bullion, and coin	526	14,036	26.68							526	14,036	26.68
Electrical machinery and apparatus	1,056,084	398,289	.38	987,143	295,689	.30	22,155	14,430	.65	46,786	88,170	1.88
Electric dynamos and transformers	858,555	241,384	.28	854,729	239,218	.28	3,826	2,166	.57			
Mercury power rectifiers	145,096	70,008	.48	132,414	56,471	.43	7,855	4,991	.64	4,827	8,546	1.77
Industrial machinery	915,363	656,484	.72	440,617	172,686	.39	120,475	97,508	.81	354,271	386,290	1.09
Machine tools for working metal, wood, stone, etc.	357,931	358,086	1.00				17,791	13,595	.76	340,140	344,491	1.01
Machinery for the manufacture and processing of foodstuffs	219,920	88,430	.40	219,920	88,430	.40						
Office appliances (chiefly typewriters and parts)	85,047	118,353	1.39				112	62	.55	84,935	118,291	1.39
Printing and bookbinding machinery	7,810	4,556	.58				7,787	4,429	.57	23	127	5.52
Agricultural machinery and implements	6,663	3,863	.58				6,307	3,227	.51	356	636	1.79
Automobiles and other vehicles	214	258	1.21							214	258	1.21
Coal-tar products	1,943,214	2,311,701	1.19	17,985	5,408	.30	533,798	510,109	.96	1,391,431	1,796,184	1.29
Colors from aniline, anthracene, and naphthalene and coal-tar colors	1,888,814	2,269,699	1.20				519,413	497,180	.96	1,369,401	1,772,519	1.29
Medicinal and pharmaceutical preparations	116,796	400,443	3.43	1,346	477	.35				115,450	399,966	3.46
Chemical specialties	140,557	73,703	.52	24,735	8,701	.35	115,822	65,002	.56			
Powders for laundry purposes	133,021	71,100	.53	17,199	6,098	.35	115,822	65,002	.56			
Industrial chemicals	34,266	61,000	1.78	7,336	2,237	.30	1,525	761	.50	25,405	58,002	2.28
Pigments, paints, and varnishes	11,483	4,132	.36	9,967	3,377	.34	1,516	755	.50			
Soap and toilet preparations	80,549	289,834	3.60							80,549	289,834	3.60
Photographic and projection goods	4,470	12,325	2.76				3,684	3,624	.98	786	8,701	11.07
Scientific and professional instruments, apparatus and supplies	7,945	42,365	5.33							7,945	42,365	5.33
Musical instruments	490,206	314,000	.64	302,011	128,980	.43	179,968	174,570	.97	8,227	10,450	1.27
Phonographs, gramophones, motion-picture projectors, and similar apparatus	307,845	136,183	.44	302,011	128,980	.43				5,834	7,203	1.23
Musical apparatus, such as music boxes, barrel organs, etc., and parts	182,361	177,817	.98				179,968	174,570	.97	2,393	3,247	1.36
Miscellaneous office supplies	401	407	1.01				352	212	.60	49	195	3.98
Toys, athletic and sporting goods (toys)	804	729	.91	180	67	.37	270	192	.71	354	470	1.33
Firearms, ammunition, and fireworks	637	6,684	10.49							637	6,684	10.49
Books, maps, pictures, and other printed matter	28,522	27,937	.99	3,134	868	.28	2,844	2,429	.85	22,544	24,640	1.09
Clocks and watches	353,321	10,139,031	28.70							353,321	10,139,031	28.70
Finished watch movements	268,281	7,314,636	27.26							268,281	7,314,636	27.26
Art works	20,742	80,604	3.89							20,742	80,604	3.89
Jewelry	186	6,251	33.61							186	6,251	33.61
Miscellaneous, n. e. s.	21,160	29,478	1.39				1,385	767	.55	19,775	28,711	1.45

Digitized by Google

TABLE 13.—*Switzerland: Selected Exports to Middle America by Commodity Groups and Value-per-Pound Ranges, 1938*

[Shipping weight in pounds; value in dollars.]

Commodity group	Total			25 cents to 49 cents per pound			50 cents to 99 cents per pound			$1.00 and over per pound		
	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound
Middle America, Switzerland's selected exports to, total	4,055,669	4,518,509	$1.11	2,866,065	896,120	$0.31	179,400	128,296	$0.72	1,010,204	3,494,093	$3.46
"Other" edible animal products (meat extract preparations, solid or liquid)	20,954	6,429	.31	20,954	6,429	.31						
Leather manufactures (boots, shoes, and slippers, of leather)	754	1,209	1.60							754	1,209	1.60
"Other" inedible animals and animal products (dogs)	58	46	.79				58	46	.79			
Fruits and preparations (preserves and delicacies)	22,463	5,712	.25	22,463	5,712	.25						
Table beverages (chocolate)	30,848	8,518	.28	30,848	8,518	.28						
Rubber and manufactures	42,434	16,469	.39	42,434	16,469	.39						
Vegetable oils (essential oils)	15	23	1.53							15	23	1.53
Miscellaneous vegetable products (starch gum)	19,643	6,678	.34	19,643	6,678	.34						
Cotton semimanufactures (yarn)	77,871	91,111	1.17							77,871	91,111	1.17
Cotton manufactures	219,988	435,907	1.98				1,858	1,832	.99	218,130	434,075	1.99
Fabrics	148,341	274,628	1.85				1,858	1,832	.99	146,483	272,796	1.86
Embroideries	65,695	151,731	2.31							65,695	151,731	2.31
Vegetable fibers and manufactures	2,271	4,182	1.84				1,454	851	.59	817	3,331	4.08
Wool manufactures	4,987	8,319	1.67							4,987	8,319	1.67
Silk and manufactures	844	12,016	14.24							844	12,016	14.24
Rayon, nylon, and other synthetic textiles	275,213	186,816	.68	210,974	79,291	.38	30,178	25,565	.85	34,061	81,960	2.41
Artificial silk yarn, crude, viscose silk, single and twisted	191,529	71,715	.37	191,529	71,715	.37						
Miscellaneous textile products	35,678	67,441	1.89							35,678	67,441	1.89
Paper, related products and manufactures	3,048	897	.29	3,048	897	.29						
Glass and glass products (insulators, mounted)	3,029	1,532	.51	1,421	515	.36	1,608	1,017	.63			
Clay and clay products	3,679	1,283	.35	3,679	1,283	.35						
"Other" nonmetallic minerals including precious (precious, semiprecious, and synthetic stones, not set, except garnets, sapphires, and rubies for watchmakers' use)	51	1,788	35.06							51	1,788	35.06
Steel mill manufactures (pipe fittings, coated with zinc, tin, nickel, copper, etc.)	1,729	674	.39	1,729	674	.39						
Iron and steel advanced manufactures	2,526	4,399	1.74							2,526	4,399	1.74
Nonferrous ores, metals, and alloys, except precious	707,890	205,357	.29	698,312	196,980	.28	7,762	4,458	.57	1,816	3,919	2.16
Aluminum and alloys hammered, in bars, sheets, pipes, wire; and stamped washers	475,050	130,430	.27	470,442	127,884	.27	4,608	2,546	.55			
Goods of aluminum and aluminum alloys, except for industrial and construction uses	231,024	71,008	.31	227,870	69,096	.30	3,154	1,912	.61			
Electrical machinery and apparatus	855,695	321,751	.38	735,065	213,959	.29	72,853	51,001	.70	47,777	56,791	1.19
Electric dynamos and transformers	629,187	165,920	.26	629,187	165,920	.26						
Mercury power rectifiers	152,217	90,454	.59	94,959	44,716	.47	52,576	38,124	.73	4,682	7,614	1.63
Industrial machinery	646,782	230,201	.36	590,047	191,621	.32	54,800	35,656	.65	1,935	2,924	1.51
Stationary steam engines, steam dredges, hammers, etc.	78,739	35,434	.45	77,496	34,233	.44	1,243	1,201	.97			
Hydraulic and wind motors and pumps	310,800	90,836	.29	310,800	90,836	.29						
Office appliances	34,617	55,511	1.60							34,617	55,511	1.60
Printing and bookbinding machinery (printing presses)	4,081	1,776	.44	4,081	1,776	.44						
Automobiles and other vehicles (automobiles and chassis, including electric motorcars, weighing more than 1,600 kilograms (3,527 pounds) each, also detached parts	176,577	66,518	.38	176,577	66,518	.38						
Coal-tar products	160,834	235,499	1.46	6,465	3,180	.49				154,369	232,319	1.50
Colors from aniline, anthracene, and naphthalene and coal-tar colors	154,369	232,319	1.50							154,369	232,319	1.50
Medicinal and pharmaceutical preparations	524,841	709,968	1.35	257,248	79,530	.31	5,585	5,417	.97	262,008	625,021	2.39
Artificial alimentary substances such as "somatose", "nutrose" and "tropon", etc. (nutrients for wasting diseases, etc.)	257,248	79,530	.31	257,248	79,530	.31						
Chemical specialties (powders for laundry purposes)	16,307	7,167	.44	16,307	7,167	.44						
Industrial chemicals (methy alcohol, collodion, and similar products)	19,953	7,201	.36	19,953	7,201	.36						
Pigments, paints, and varnishes (turkey-red oil and other sulforicinates)	1,722	597	.35	1,722	597	.35						
Soap and toilet preparations	35,054	143,721	4.10							35,054	143,721	4.10
Scientific and professional instruments, apparatus and supplies (mathematical and astronomical)	4,116	19,943	4.85							4,116	19,943	4.85
Musical instruments (phonographs, gramophones, motion-picture projectors, and similar apparatus)	1,880	3,307	1.76							1,880	3,307	1.76
Miscellaneous office supplies	3,095	1,125	.36	3,095	1,125	.36						
Firearms, ammunition, and fireworks	3,035	29,153	9.61							3,035	29,153	9.61
Books, maps, pictures, and other printed matter (paper, printed, other than lithographed, in loose sheets or pamphlet from)	3,244	2,453	.76				3,244	2,453	.76			
Clocks and watches	71,911	1,595,694	22.19							71,911	1,595,694	22.19
Art works (prints other than photographs, not framed)	14,590	17,065	1.17							14,590	17,065	1.17
Jewelry	248	1,511	6.09							248	1,511	6.09
Miscellaneous, n. e. s.	1,114	1,542	1.38							1,114	1,542	1.38

Digitized by Google

TABLE 14.—*Switzerland: Selected Exports to South America by Commodity Groups and Value-per-Pound Ranges, 1938*

[Shipping weight in pounds; value in dollars.]

Commodity group	Total			25 cents to 49 cents per pound			50 cents to 99 cents per pound			$1.00 and over per pound		
	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound
South America, Switzerland's selected exports to, total	10,048,436	12,084,022	$1.20	6,811,382	2,136,395	$0.31	1,056,710	738,033	$0.70	2,180,344	9,208,694	$4.22
Meat products (bladders, intestines, rennet)	1,662	648	.39	1,649	617	.37				13	31	2.38
"Other" edible animal products (meat extract preparations, solid or liquid)	13,073	3,784	.29	13,073	3,784	.29						
Leather manufactures	5,709	11,917	2.09				1,844	1,343	.73	3,865	10,574	2.74
Furs and manufactures	115	3,305	28.74							115	3,305	28.74
"Other" inedible animals and animal products (dogs)	58	46	.79				58	46	.79			
Fruits and preparations (preserves and delicacies)	45,653	25,637	.56	21,995	6,844	.31	23,658	18,793	.79			
Vegetable oils (essential oils)	5,175	6,682	1.29							5,175	6,682	1.29
Table beverages (chocolate)	21,260	5,767	.27	21,260	5,767	.27						
Beverages, n. e. s. (brandy)	7,795	2,431	.31	7,795	2,431	.31						
Rubber and manufactures	30,770	12,474	.41	27,256	8,324	.31	1,331	667	.50	2,183	3,483	1.60
Drugs, herbs, leaves, and roots, crude	42	87	2.07							42	87	2.07
Vegetable dyeing and tanning extracts	707	1,933	2.73							707	1,933	2.73
Tobacco and manufactures (cigars)	27	28	1.04							27	28	1.04
Miscellaneous vegetable products (starch gum)	29,802	12,732	.43	29,802	12,732	.43						
Cotton semimanufactures (yarn)	324,904	114,107	.35	288,288	87,999	.31	36,616	26,108	.71			
Cotton manufactures	429,548	826,148	1.92	3,376	1,618	.48	4,051	3,930	.97	422,121	820,600	1.94
Fabrics	329,864	559,700	1.70				4,051	3,930	.97	325,813	555,770	1.71
Vegetable fibers and manufactures	4,864	11,220	2.31							4,864	11,220	2.31
Wool, unmanufactured (raw, scoured, dyed)	95	118	1.24							95	118	1.24
Wool semimanufactures (yarn)	49,444	39,613	.80				46,416	35,545	.77	3,028	4,068	1.34
Wool manufactures	18,211	53,485	2.94							18,211	53,485	2.94
Silk and manufactures	28,441	141,728	4.98							28,441	141,728	4.98
Rayon, nylon, and other synthetic textiles	589,812	429,651	.73	455,075	180,510	.40	78,023	44,628	.57	56,714	204,513	3.61
Artificial silk yarn, crude, viscose silk, single and twisted	492,592	205,645	.42	426,304	168,086	.39	66,288	37,559	.57			
Miscellaneous textile products	99,664	164,657	1.65				8,724	7,930	.91	90,940	156,727	1.72
Paper, related products and manufactures (envelopes in boxes, folders, with or without notepaper)	4,921	1,929	.39	4,921	1,929	.39						
Glass and glass products	15,536	10,998	.71	6,514	1,798	.28	7,851	7,471	.95	1,171	1,729	1.48
Clay and clay products	1,975	722	.37	1,975	722	.37						
"Other" nonmetallic minerals, including precious	11,513	52,738	4.58	9,844	3,402	.35	1,255	758	.60	414	48,578	117.34
Steel mill manufactures	523,949	202,162	.39	523,949	202,162	.39						
Pipe fittings, coated with zinc, tin, nickel, copper, etc	501,814	194,223	.39	501,814	194,223	.39						
Iron and steel advanced manufactures	27,385	31,212	1.14	10,978	4,212	.38				16,407	27,000	1.65
Nonferrous ores, metals, and alloys, except precious	864,624	369,601	.43	607,308	180,586	.30	246,357	174,822	.71	10,959	14,193	1.30
Goods of nickel or nickel alloys	191,822	144,329	.75				191,822	144,329	.75			
Aluminum and alloys, hammered, in bars, sheets, pipes, wire; and stamped washers	561,068	162,057	.29	558,038	160,476	.29	3,030	1,581	.52			
Precious metals and plated ware, except jewelry, bullion, and coin	476	23,870	50.15							476	23,870	50.15
Electrical machinery and apparatus	2,430,020	839,496	.35	2,136,763	587,466	.27	209,340	148,252	.71	83,917	103,778	1.24
Electric dynamos and transformers	1,947,499	503,723	.26	1,947,499	503,723	.26						
Mercury power rectifiers	389,381	229,106	.59	187,568	83,077	.44	195,043	136,909	.70	6,773	9,120	1.35
Industrial machinery	2,248,031	798,975	.36	2,055,089	642,753	.31	163,723	103,652	.63	29,219	52,570	1.80
Stationary steam engines, steam dredges, hammers, etc	332,688	109,548	.33	321,305	101,379	.32	11,383	8,169	.72			
Hydraulic and wind motors and pumps	299,415	98,742	.33	299,415	98,742	.33						
Machine tools for working metal, wood, stone, etc	208,228	89,692	.43	161,507	65,422	.41	46,721	24,270	.52			
Weaving, machinery, reeling, warping, beaming, sizing, measuring, folding; also looms	401,858	138,700	.35	401,858	138,700	.35						
Office appliances	85,404	136,620	1.60							85,404	136,620	1.60
Printing and bookbinding machinery	271,752	90,912	.33	262,214	82,284	.31	9,538	8,628	.90			
Printing presses	251,215	77,884	.31	249,046	76,139	.31	2,169	1,745	.80			
Automobiles and other vehicles (chiefly automobiles and chassis, including electric motor cars, weighing more than 1,600 kilograms (3,527 pounds) each, also detached parts)	150,706	62,793	.42	128,793	48,352	.38	20,347	12,764	.63	1,566	1,677	1.07
Coal-tar products	477,796	590,406	1.24	2,971	896	.30	112,654	86,502	.77	362,171	503,008	1.39
Colors from aniline, anthracene, and naphthalene and coal-tar colors	433,522	562,525	1.30				71,351	59,517	.83	362,171	503,008	1.39
Medicinal and pharmaceutical preparations	502,439	1,338,942	2.66	152,628	55,249	.36	6,530	5,093	.78	343,281	1,278,600	3.72
Artificial alimentary substances, such as "somatose", "nutrose", "tropon", etc. (nutrients for treating wasting diseases, etc.)	156,306	57,641	.37	152,628	55,249	.36	3,678	2,392	.65			
Chemical specialties	40,653	23,168	.57	10,947	3,667	.33	25,776	15,252	.59	3,930	4,249	1.08
Industrial chemicals	22,529	14,030	.62	3,184	1,186	.37	19,345	12,844	.66			
Pigments, paints and varnishes (turkey-red oil and other sulforicinates)	4,329	1,950	.45	4,329	1,950	.45						
Soap and toilet preparations	91,996	292,930	3.18	3,260	1,476	.45				88,736	291,454	3.28
Photographic and projection goods (photographic dry plates of polished glass)	759	2,553	3.36							759	2,553	3.36
Scientific and professional instruments, apparatus and supplies	27,529	104,036	3.78							27,529	104,036	3.78
Musical instruments (phonographs, gramophones, motion-picture projectors and similar apparatus)	20,123	13,540	.67	3,413	1,571	.46	16,710	11,969	.72			
Miscellaneous office supplies (pencils)	5,311	3,899	.73				5,311	3,899	.73			
Firearms, ammunition and fireworks	321,829	1,170,816	3.64							321,829	1,170,816	3.64
Arms, finished	260,413	872,491	3.35							260,413	872,491	3.35
Books, maps, pictures, and other printed matter	9,500	6,401	.67	6,132	2,382	.39	1,416	1,073	.76	1,952	2,046	1.51
Clocks and watches	157,872	4,006,563	25.38				1,651	1,626	.98	156,221	4,004,937	25.64
Art works (prints other than photographs, not framed)	7,650	14,412	1.88							7,650	14,412	1 88
Jewelry	212	3,086	14.56							212	3,086	14.56
Miscellaneous, n. e. s.	14,786	7,064	.48	6,601	1,726	.26	8,185	5,338	.65			

Digitized by Google

TABLE 15.—*Switzerland: Selected Exports to Africa by Commodity Groups and Value-per-Pound Ranges, 1938*

[Shipping weight in pounds; value in dollars.]

Commodity group	Total			25 cents to 49 cents per pound			50 cents to 99 cents per pound			$1.00 and over per pound		
	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound
Africa, Switzerland's selected exports to, total	3,752,362	3,662,818	$0.98	2,563,933	827,467	$0.32	695,513	532,874	$0.77	492,916	2,302,477	$4.67
"Other" edible animal products (meat extract preparations, solid or liquid)	2,978	855	.29	2,978	855	.29						
Leather	3,682	8,556	2.32							3,682	8,556	2.32
Leather manufactures (boots, shoes, and slippers)	53,153	101,325	1.91							53,153	101,325	1.91
Table beverages (chocolate)	49,285	13,831	.28	49,285	13,831	.28						
Sugar and related products (confectionery and sweet-meats)	4,436	1,249	.28	4,436	1,249	.28						
Rubber and manufactures	7,695	4,114	.53				7,695	4,114	.53			
Vegetable oils (essential oils)	9	7	.78				9	7	.78			
Vegetable dyeing and tanning extracts	858	1,413	1.65							858	1,413	1.65
Cotton semimanufactures (yarn, bleached, glazed, mercerized, dyed and printed)	11,682	4,839	.41	9,857	3,520	.36	1,825	1,319	.72			
Cotton manufactures	657,108	587,422	.89	4,584	1,591	.35	579,869	458,317	.79	72,655	127,514	1.76
Fabrics	437,809	347,808	.79	1,716	477	.28	417,089	310,642	.74	19,004	36,689	1.93
Embroideries	202,836	205,891	1.02				162,780	147,675	.91	40,056	58,216	1.45
Vegetable fibers and manufactures	1,277	4,738	3.71							1,277	4,738	3.71
Wool semimanufactures (yarn)	1,809	2,446	1.35							1,809	2,446	1.35
Wool manufactures	15,526	56,376	3.63							15,526	56,376	3.63
Silk and manufactures	34,861	84,011	2.41							34,861	84,011	2.41
Rayon, nylon, and other synthetic textiles	86,574	193,853	2.24	1,546	660	.43	2,079	1,491	.72	82,949	191,702	2.31
Artificial silk fabrics	57,530	80,267	1.40				2,079	1,491	.72	55,451	78,776	1.42
Miscellaneous textile products	23,217	66,817	2.88							23,217	66,817	2.88
Wood manufactures (cabinetmakers' goods, fancy)	1,199	1,423	1.19							1,199	1,423	1.19
"Other" nonmetallic minerals including precious (asbestos and mica fabrics, other than insulating tubes with sheath or base metal)	7,709	3,044	.39	7,709	3,044	.39						
Steel mill manufactures	28,277	9,579	.34	28,277	9,579	.34						
Iron and steel advanced manufactures	9,995	6,557	.66	8,470	3,111	.37				1,525	3,446	2.26
Nonferrous ores, metals, and alloys except precious	459,714	152,952	.33	456,142	148,337	.33	1,408	902	.64	2,164	3,713	1.72
Aluminum and alloys, hammered, in bars, sheets, pipes, wire; and stamped washers	222,008	73,697	.33	222,008	73,697	.33						
Goods of aluminum for other than industrial and construction uses	229,863	73,204	.32	228,455	72,302	.32	1,408	902	.64			
Precious metals, and plated ware, except jewelry, bullion, and coin (silversmiths' goods, gilded or not)	1,220	2,012	1.65							1,220	2,012	1.65
Electrical machinery and apparatus	379,327	161,792	.43	277,020	77,538	.28	82,439	51,883	.63	19,868	32,371	1.63
Electric dynamos and transformers	272,724	75,962	.28	272,724	75,962	.28						
Mercury power rectifiers	83,312	61,124	.73	4,296	1,576	.37	67,897	42,781	.63	11,119	16,767	1.51
Industrial machinery	1,646,466	557,252	.34	1,629,494	537,955	.33	13,518	10,695	.79	3,454	8,602	2.49
Stationary steam engines, steam dredges, hammers, etc.	206,199	67,705	.33	206,199	67,705	.33						
Hydraulic and wind motors, and pumps	617,001	248,312	.40	617,001	248,312	.40						
Machinery for the manufacture and processing of foodstuffs	760,520	207,746	.27	759,760	206,139	.27				760	1,607	2.11
Office appliances (chiefly typewriters and parts)	37,568	53,386	1.42							37,568	53,386	1.42
Automobiles and other vehicles (children's carts, perambulators, sleighs, and velocipedes)	9,518	2,365	.25	9,518	2,365	.25						
Coal-tar products (colors from aniline, anthracene, and naphthalene, and coal-tar colors)	30,541	38,012	1.24							30,541	38,012	1.24
Medicinal and pharmaceutical preparations	100,234	76,871	.77	74,617	23,832	.32				25,617	53,039	2.07
Artificial alimentary substances, such as "somatose", "nutrose", "tropon", etc. (nutrients for wasting diseases, etc.)	74,617	23,832	.32	74,617	23,832	.32						
Soap and toilet preparations	1,445	2,883	2.00							1,445	2,883	2.00
Scientific and professional instruments, apparatus and supplies (orthopedic, astronomical, and mathematical)	8,318	39,321	4.73							8,318	39,321	4.73
Musical instruments (phonographs, gramophones, motion-picture projectors, and similar apparatus)	10,237	17,360	1.70				4,694	3,053	.65	5,543	14,307	2.58
Books, maps, pictures, and other printed matter (paper printed or lithographed in loose sheets or pamphlet form)	1,977	1,093	.55				1,977	1,093	.55			
Clocks and watches	62,102	1,401,116	22.56							62,102	1,401,116	22.56
Miscellaneous, n. e. s.	2,365	3,948	1.67							2,365	3,948	1.67

TABLE 16.—*Switzerland: Selected Exports to Asia by Commodity Groups and Value-per-Pound Ranges, 1938*

[Shipping weight in pounds; value in dollars.]

Commodity group	Total			25 cents to 49 cents per pound			50 cents to 99 cents per pound			$1.00 and over per pound		
	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound
Asia, Switzerland's selected exports to, total	12,283,965	18,356,472	$1.49	5,983,677	1,843,409	$0.31	2,299,936	1,777,377	$0.77	4,000,352	14,735,686	$3.68
Meat products (bladders, intestines, rennet)	217	503	2.32							217	503	2.32
"Other" edible animal products (meat extract preparations, solid or liquid)	88,817	24,311	.27	88,817	24,311	.27						
Leather	7,528	10,668	1.42							7,528	10,668	1.42
Leather manufactures (chiefly boots, shoes, and slippers)	42,939	70,013	1.63							42,939	70,013	1.63
"Other" inedible animals and animal products (dogs)	58	23	.40	58	23	.40						
Table beverages (chocolate)	14,581	3,742	.26	14,581	3,742	.26						
Spices (unground, except saffron)	23	49	2.13							23	49	2.13
Sugar and related products (confectionery and sweetmeats)	41,763	26,676	.64	2,541	792	.31	39,222	25,884	.66			
Rubber and manufactures	5,858	3,825	.65	3,239	1,066	.33	1,841	1,363	.74	778	1,396	1.79
Drugs, herbs, leaves, and roots, crude	125,223	34,328	.27	125,221	34,305	.27				2	23	11.50
Vegetable oils (essential oils)	4,045	3,406	.84				4,016	3,371	.84	29	35	1.21
Vegetable dyeing and tanning extracts	2,578	974	.38	2,578	974	.38						
Tobacco and manufactures (cigars)	56	67	1.20							56	67	1.20
Miscellaneous vegetable products (starch gum)	40,944	16,107	.39	40,944	16,107	.39						
Cotton semimanufactures (yarn)	50,483	17,704	.35	50,483	17,704	.35						

Digitized by Google

TABLE 16.—*Switzerland: Selected Exports to Asia by Commodity Groups and Value-per-Pound Ranges, 1938—Continued*

[Shipping weight in pounds; value in dollars.]

Commodity group	Total			25 cents to 49 cents per pound			50 cents to 99 cents per pound			$1.00 and over per pound		
	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound
Cotton manufactures	1,411,060	1,794,829	$1.27				57,695	47,730	$0.83	1,353,365	1,747,099	$1.29
Fabrics	491,915	681,345	1.39				50,636	42,261	.83	441,279	639,084	1.45
Embroideries and laces	860,310	1,018,573	1.18				7,059	5,469	.77	853,251	1,013,104	1.19
Vegetable fibers and manufactures	18,223	78,045	4.28							18,223	78,045	4.28
Wool manufactures	4,510	7,721	1.71				1,741	1,643	.94	2,769	6,078	2.20
Silk and manufactures	26,198	102,557	3.91	2,349	932	$0.40				23,849	101,625	4.26
Rayon, nylon, and other synthetic textiles	17,895	44,912	2.51							17,895	44,912	2.51
Miscellaneous textile products	6,606	15,315	2.32				130	79	.61	6,476	15,236	2.35
Wood manufactures	1,596	1,065	.67				1,383	752	.54	213	313	1.47
Paper, related products, and manufactures	29,330	8,403	.29	29,330	8,403	.29						
Glass and glass products (white polished glass except photographic dry plates or watch glasses)	1,723	6,757	3.92							1,723	6,757	3.92
Clay and clay products (vitrifications, enamel, and glass beads)	796	1,452	1.82							796	1,452	1.82
"Other" nonmetallic minerals, including precious	110,779	101,525	.92	101,856	47,842	.47	94	57	.61	8,829	53,626	6.07
Precious, semiprecious and synthetic stones not set, except garnets, sapphires, and rubies for watch-makers' use)	102,482	96,623	.94	96,729	46,246	.48	94	57	.61	5,659	50,320	8.89
Steel mill manufactures	14,457	6,388	.44	11,277	3,822	.34	3,180	2,566	.81			
Iron and steel advanced manufactures	15,847	26,349	1.66	9,989	4,351	.44	2,143	1,976	.92	3,715	20,022	5.39
Nonferrous ores, metals, and alloys, except precious	592,347	196,162	.33	578,891	166,646	.29	2,828	2,042	.72	10,628	27,474	2.59
Aluminum and alloys hammered, in bars, sheets, pipes, wire; and stamped washers	412,954	112,387	.27	412,954	112,387	.27						
Goods of aluminum and alloys for other than industrial and construction uses	110,239	33,460	.30	110,239	33,460	.30						
Precious metals, and plated ware, except jewelry, bullion, and coin (silversmiths' goods, gilded or not)	423	2,570	6.08							423	2,570	6.08
Electrical machinery and apparatus	1,056,672	667,463	.63	633,068	210,859	.33	295,401	229,649	.78	128,203	226,955	1.77
Electric dynamos and transformers	308,874	90,497	.29	307,505	89,790	.29	1,369	707	.52			
Mercury power rectifiers	186,253	123,513	.66	42,778	18,946	.44	132,278	87,668	.66	11,197	16,899	1.51
Electric locomotives	261,334	94,872	.36	261,334	94,872	.36						
Industrial machinery	4,704,862	1,995,469	.42	3,392,031	1,005,355	.30	1,308,920	977,848	.75	3,911	12,266	3.14
Stationary steam engines, steam dredges, hammers, etc.	1,119,217	366,056	.33	1,103,154	355,617	.32	16,063	10,439	.65			
Hydraulic and wind motors and pumps	839,284	231,652	.28	839,284	231,652	.28						
Machine tools for working metal, wood, stone, etc.	1,186,635	879,902	.74	33,207	11,637	.35	1,153,428	868,265	.75			
Machinery for the manufacture and processing of foodstuffs	1,174,550	332,804	.28	1,142,801	314,742	.28	31,749	18,062	.57			
Office appliances (chiefly typewriters and parts)	48,475	70,487	1.45							48,475	70,487	1.45
Printing and bookbinding machines (machinery for graphic arts)	5,143	2,435	.47	5,143	2,435	.47						
Automobiles and other vehicles (automobiles and chassis, including electric motorcars, weighing more than 1600 kilograms (3,527 pounds) each, also detached parts)	10,943	6,346	.58				10,943	6,346	.58			
Coal-tar products	1,202,627	1,355,254	1.13				503,567	432,715	.86	699,060	922,539	1.32
Colors from aniline, anthracene, and naphthalene, and coal-tar colors	1,079,587	1,244,870	1.15				464,514	407,541	.88	615,073	837,329	1.36
Medicinal and pharmaceutical preparations	861,562	1,068,447	1.24	368,171	122,016	.33				493,391	946,431	1.92
Artificial alimentary substances, such as "somatose", "nutrose", "tropon" (nutrients for wasting diseases, etc.)	365,540	121,368	.33	365,540	121,368	.33						
Chemical specialties (chiefly powder for laundry purposes)	47,551	20,395	.43	47,551	20,395	.43						
Industrial chemicals (methyl alcohol, collodion, and similar products)	5,887	3,515	.60	5,619	2,546	.45				268	969	3.62
Pigments, paints and varnishes (turkey-red oil and other sulforicinates)	30,987	12,139	.39	21,529	6,593	.31	9,458	5,546	.59			
Explosives, fuses, etc. (explosives and inflammables)	6,227	4,998	.80				6,227	4,998	.80			
Soap and toilet preparations	291,333	245,649	.84	134,799	56,551	.42	23,919	16,337	.68	132,615	172,761	1.30
Scientific and professional instruments, apparatus, and supplies	36,233	262,811	7.25				20	11	.55	36,213	262,800	7.26
Musical instruments (phonographs, gramophones, motion picture projectors, and similar apparatus)	326,210	103,047	.32	311,669	84,728	.27	4,766	2,749	.58	9,775	15,570	1.59
Miscellaneous office supplies	2,216	1,902	.86				1,554	1,165	.75	662	737	1.11
Toys, athletic, and sporting goods (toys)	187	100	.53	167	79	.47				20	21	1.05
Firearms, ammunition, and fireworks	600,916	4,660,534	7.76							600,916	4,660,534	7.76
Ammunition for portable firearms	422,892	2,932,265	6.93							422,892	2,932,265	6.93
Books, maps, pictures, and other printed matter (paper, printed or lithographed in loose sheets or pamphlet form)	46,045	92,172	2.00				1,337	692	.52	44,708	91,480	2.05
Clocks and watches	318,716	5,163,607	16.20				19,551	11,858	.61	299,165	5,151,749	17.22
Jewelry	967	9,112	9.42							967	9,112	9.42
Miscellaneous, n. e. s.	3,303	4,154	1.26	1,776	832	.47				1,527	3,322	2.18

TABLE 17.—*Switzerland: Selected Exports to Oceania by Commodity Groups and Value-per-Pound Ranges, 1938*

[Shipping weight in pounds; value in dollars.]

Commodity group	Total			25 cents to 49 cents per pound			50 cents to 99 cents per pound			$1.00 and over per pound		
	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound
Oceania, Switzerland's selected exports to, total	3,048,279	4,337,498	$1.42	1,677,486	502,496	$0.30	274,612	222,158	$0.81	1,096,181	3,612,844	$3.30
Meat products (bladders, intestines, and rennet)	102	103	1.01							102	103	1.01
"Other" edible animal products (meat extract preparations, solid or liquid)	2,340	714	.31	2,340	714	.31						
Leather manufactures (boots, shoes, and slippers of leather)	16,900	37,700	2.23							16,900	37,700	2.23
Fruits and preparations (preserves and delicacies)	1,871	473	.25	1,871	473	.25						
Table beverages (chocolate)	31,592	8,581	.27	31,592	8,581	.27						
Rubber and manufactures	2,622	1,445	.55				2,622	1,445	.55			
Vegetable dyeing and tanning extracts	949	1,397	1.47							949	1,397	1.47
Seeds, except oilseeds	1,667	496	.30	1,667	496	.30						

Digitized by Google

TABLE 17.—*Switzerland: Selected Exports to Oceania by Commodity Groups and Value-per-Pound Ranges, 1938—Continued*

[Shipping weight in pounds; value in dollars.]

Commodity group	Total			25 cents to 49 cents per pound			50 cents to 99 cents per pound			$1.00 and over per pound		
	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound
Cotton manufactures	319,799	477,612	$1.49							319,799	477,612	$1.49
Fabrics	67,535	121,277	1.80							67,535	121,277	1.80
Embroideries and laces	242,064	326,084	1.35							242,064	326,084	1.35
Vegetable fibers and manufactures	3,450	14,379	4.17							3,450	14,379	4.17
Wool manufactures	2,195	9,089	4.14							2,195	9,089	4.14
Silk and manufactures	20,906	120,191	5.75							20,906	120,191	5.75
Rayon, nylon, and other synthetic textiles	295,278	492,480	1.67	4,101	1,572	$0.38	1,257	1,113	$0.89	289,920	489,795	1.69
Artificial silk fabrics	238,160	326,764	1.37							238,160	326,764	1.37
Miscellaneous textile products	106,702	115,888	1.09							106,702	115,888	1.09
Hats and other articles of straw, cane, etc., dyed, printed or ornamented	103,884	109,040	1.05							103,884	109,040	1.05
Wood manufactures (veneers of all kinds)	4,233	13,310	3.14							4,233	13,310	3.14
"Other" nonmetallic minerals, including precious	11,578	4,847	.42	11,563	2,965	.26				15	1,882	125.47
Steel mill manufactures (pipe fittings, coated with zinc, tin, nickel, copper, etc.)	16,430	6,569	.40	16,430	6,569	.40						
Iron and steel advanced manufactures	6,047	14,150	2.34							6,047	14,150	2.34
Nonferrous ores, metals, and alloys, except precious	218,221	59,563	.27	218,221	59,563	.27						
Aluminum and alloys, hammered, in bars, sheets, pipes, wire; and stamped washers	216,836	59,168	.27	216,836	59,168	.27						
Electrical machinery and apparatus	1,097,166	449,909	.41	962,273	282,490	.29	18,532	10,548	.57	116,361	156,871	1.35
Electric dynamos and transformers	739,491	186,441	.25	739,491	186,441	.25						
Mercury power rectifiers	256,026	130,158	.51	222,782	96,049	.43	18,532	10,548	.57	14,712	23,561	1.60
Electric meters	101,649	133,310	1.31							101,649	133,310	1.31
Industrial machinery	571,666	290,177	.51	403,613	132,437	.33	121,702	97,401	.80	46,351	60,339	1.30
Stationary steam engines, steam dredges, hammers, etc	112,654	43,441	.39	112,654	43,441	.39						
Machine tools for working metal, wood, stone, etc	94,544	79,558	.84				94,544	79,558	.84			
Machinery for the manufacture and processing of foodstuffs	193,148	58,679	.30	193,148	58,679	.30						
Office appliances (chiefly typewriters and parts)	15,542	24,052	1.55							15,542	24,052	1.55
Printing and bookbinding machinery (printing presses)	2,318	577	.25	2,318	577	.25						
Agricultural machinery and implements (agricultural and horticultural implements)	1,049	1,954	1.86							1,049	1,954	1.86
Automobiles and other vehicles (automobiles and chassis, including electric motorcars, weighing more than 1,600 kilograms (3,527 pounds) each, also detached parts)	4,688	3,457	.74				4,688	3,457	.74			
Coal-tar products (colors from aniline, anthracene, and naphthalene, and coal-tar colors)	106,184	90,417	.85				106,184	90,417	.85			
Medicinal and pharmaceutical preparations	17,803	54,023	3.03							17,803	54,023	3.03
Chemical specialties (powders for laundry purposes)	20,209	5,600	.28	20,209	5,600	.28						
Industrial chemicals (methyl alcohol, collodion, and similar products)	1,288	459	.36	1,288	459	.36						
Soap and toilet preparations	16,283	21,116	1.30				3,204	2,394	.75	13,079	18,722	1.43
Scientific and professional instruments, apparatus, and supplies (orthopedic, astronomical, and mathematical)	8,255	20,723	2.51							8,255	20,723	2.51
Musical instruments (chiefly phonographs, gramophones, motion-picture projectors, and similar apparatus)	17,792	16,881	.95				16,423	15,383	.94	1,369	1,498	1.09
Toys, athletic, and sporting goods (toys)	29	34	1.17							29	34	1.17
Clocks and watches (finished watch movements account for 50 percent of both weight and of value)	99,983	1,967,844	19.68							99,983	1,967,844	19.68
Art works (prints, other than photographs, not framed)	1,885	4,026	2.14							1,885	4,026	2.14
Miscellaneous, n. e. s	3,257	7,262	2.23							3,257	7,262	2.23

TABLE 18.—*Switzerland: Selected Exports to U. S. S. R. by Commodity Groups and Value-per-Pound Ranges, 1938*

[Shipping weight in pounds; value in dollars.]

Commodity group	Total			25 cents to 49 cents per pound			50 cents to 99 cents per pound			$1.00 and over per pound		
	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound
U. S. S. R., Switzerland's selected exports to, total	2,163,773	2,182,310	$1.01	511,920	173,268	$0.34	1,420,508	1,134,091	$0.80	231,345	874,951	$3.78
Wool manufactures (carpets and rugs)	112	91	.81				112	91	.81			
"Other" nonmetallic minerals, including precious (garnets, sapphires, and rubies in the rough, for watch-makers' use)	6,155	6,683	1.09							6,155	6,683	1.09
Iron and steel advanced manufactures	21,641	67,375	3.11							21,641	67,375	3.11
Nonferrous ores, metals, and alloys, except precious	11,368	63,606	5.60							11,368	63,606	5.60
Electrical machinery and apparatus (mercury power rectifiers)	76,432	45,612	.60				71,591	39,251	.55	4,841	6,361	1.31
Industrial machinery	1,957,615	1,427,012	.73	511,920	173,268	.34	1,348,805	1,094,749	.81	96,890	158,995	1.64
Stationary steam engines, steam dredges, hammers, etc	84,268	113,261	1.34							84,268	113,261	1.34
Machine tools for working metal, wood, stone, etc	1,046,758	942,618	.90				1,046,758	942,618	.90			
Machinery for the manufacture and processing of foodstuffs	507,036	171,125	.34	507,036	171,125	.34						
Automobiles and other vehicles (speedometers for motor vehicles)	369	2,019	5.47							369	2,019	5.47
Coal-tar products (colors from aniline, anthracene, and naphthalene, and coal-tar colors)	28,727	143,288	4.99							28,727	143,288	4.99
Medicinal and pharmaceutical preparations	2	86	43.00							2	86	43.00
Soap and toilet preparations	42,513	91,504	2.15							42,513	91,504	2.15
Scientific and professional instruments, apparatus and supplies (surgical, medical, astronomical, and mathematical)	10,364	38,871	3.75							10,364	38,871	3.75
Musical instruments (phonographs, gramophones, motion-picture projectors, and similar apparatus)	3,200	8,562	2.68							3,200	8,562	2.68
Clocks and watches	4,792	272,918	56.95							4,792	272,918	56.95
Art works	483	14,683	30.40							483	14,683	30.40

Digitized by Google

TABLE 19.—*Switzerland: Selected Exports to United States by Commodity Groups and Value-per-Pound Ranges, 1938*

[Shipping weight in pounds; value in dollars.]

Commodity group	Total			25 cents to 49 cents per pound			50 cents to 99 cents per pound			$1.00 and over per pound		
	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound
United States, Switzerland's selected exports to, total	7,640,962	16,649,030	$2.18	3,314,545	1,168,563	$0.35	515,487	397,411	$0.77	3,810,930	15,083,056	$3.96
Meat products	761	851	1.12							761	851	1.12
"Other" edible animal products (meat extract preparations, solid or liquid)	122,936	34,383	.28	122,936	34,383	.28						
Leather	11,594	12,008	1.04	2,130	1,029	.48	1,934	1,694	.88	7,530	9,285	1.23
Leather manufactures	105,090	194,574	1.85				4,988	4,898	.98	100,102	189,676	1.89
Boots, shoes, and slippers of leather	103,097	189,415	1.84				4,988	4,898	.98	98,109	184,517	1.88
Furs and manufactures	217	481	2.22							217	481	2.22
"Other" inedible animals and animal products	1,171	2,439	2.08							1,171	2,439	2.08
Table beverages (chiefly chocolate)	63,587	18,396	.29	63,587	18,396	.29						
Sugar and related products (confectionery and sweetmeats)	15,779	4,791	.30	15,779	4,791	.30						
Beverages, n. e. s. (brandy)	7,932	2,642	.33	7,932	2,642	.33						
Rubber and manufactures	2,697	3,038	1.13				294	180	.61	2,403	2,858	1.19
Drugs, herbs, leaves, and roots, crude	3,193	10,418	3.26							3,193	10,418	3.26
Vegetable oils (essential oils)	355	1,015	2.86							355	1,015	2.86
Vegetable dyeing and tanning extracts	1,808	497	.27	1,808	497	.27						
Seeds, except oilseeds	309	797	2.58							309	797	2.58
Tobacco and manufactures (cigars and cigarettes)	93	102	1.10				51	43	.84	42	59	1.40
Miscellaneous vegetable products (chiefly starch gum)	19,960	8,056	.40	19,960	8,056	.40						
Cotton semimanufactures	15,105	6,461	.43	15,105	6,461	.43						
Cotton manufactures	678,448	1,186,866	1.75				8,621	6,197	.72	669,827	1,180,669	1.76
Fabrics	487,109	783,131	1.61				1,551	1,444	.93	485,558	781,687	1.61
Embroideries	112,304	249,172	2.22							112,304	249,172	2.22
Vegetable fibers and manufactures	115,090	218,937	1.90	56,702	17,872	.32	14,571	9,380	.64	43,817	191,685	4.37
Wool semimanufactures (yarn)	5,220	7,209	1.38							5,220	7,209	1.38
Wool manufactures	30,463	88,707	2.91							30,463	88,707	2.91
Silk and manufactures	27,004	376,397	13.94	757	293	.39				26,247	376,104	14.33
Rayon, nylon, and other synthetic textiles	130,252	263,329	2.02				53,648	28,983	.54	76,604	234,346	3.06
Miscellaneous textile products	408,973	514,400	1.26	21,357	9,526	.45	2,357	2,189	.93	385,259	502,685	1.30
Hats and other articles of straw, cane, etc., dyed, printed, ornamented	370,563	470,162	1.27							370,563	470,162	1.27
Wood manufactures	11,593	18,918	1.63	2,793	953	.34				8,800	17,965	2.04
Cork and manufactures (soles)	76	49	.64				76	49	.64			
Paper, related products and manufactures	3,269	9,865	3.02	731	213	.29				2,538	9,652	3.80
Glass and glass products	1,665	2,099	1.26	246	109	.44	485	482	.99	934	1,508	1.61
Clay and clay products	1,113	1,466	1.32							1,113	1,466	1.32
"Other" nonmetallic minerals, including precious	2,681	58,535	21.83	42	14	.33	665	431	.65	1,974	58,090	29.43
Steel mill manufactures	2,386	4,090	1.71				178	116	.65	2,208	3,974	1.80
Iron and steel advanced manufactures (chiefly files, rasps, and other tools)	34,728	99,224	2.86				1,147	721	.63	33,581	98,503	2.93
Nonferrous ores, metals, and alloys, except precious	2,327,435	806,269	.35	2,323,011	793,785	.34				4,424	12,484	2.82
Goods of aluminum and aluminum alloys, for other than industrial and construction uses	2,322,848	793,713	.34	2,322,848	793,713	.34						
Precious metals and plated ware, except jewelry, bullion, and coin	526	14,036	26.68							526	14,036	26.68
Electrical machinery and apparatus	49,970	80,053	1.60				9,283	5,803	.63	40,687	74,250	1.82
Industrial machinery	775,936	584,645	.75	338,306	134,378	.40	84,923	69,501	.82	352,707	380,766	1.08
Machine tools for working metal, wood, stone, etc.	340,140	344,491	1.01							340,140	344,491	1.01
Machinery for the manufacture and processing of foodstuffs	183,175	74,559	.41	183,175	74,559	.41						
Office appliances	73,049	90,070	1.23				112	62	.55	72,937	90,008	1.23
Typewriters and parts	72,770	88,926	1.22							72,770	88,926	1.22
Printing and bookbinding machinery	5,644	3,102	.55				5,621	2,975	.53	23	127	5.52
Agricultural machinery and implements	6,617	3,779	.57				6,307	3,227	.51	310	552	1.78
Automobiles and other vehicles	214	258	1.21							214	258	1.21
Coal-tar products	1,405,816	1,809,113	1.29				14,385	12,929	.90	1,391,431	1,796,184	1.29
Colors from aniline, anthracene, and naphthalene, and coal-tar colors	1,369,401	1,772,519	1.29							1,369,401	1,772,519	1.29
Medicinal and pharmaceutical preparations	84,019	329,696	3.92	1,346	477	.35				82,673	329,219	3.98
Chemical specialties	123,358	67,605	.55	7,536	2,603	.35	115,822	65,002	.56			
Powders for laundry purposes	115,822	65,002	.56				115,822	65,002	.56			
Industrial chemicals	32,741	60,239	1.84	7,336	2,237	.30				25,405	58,002	2.28
Pigments, paints, and varnishes (turkey-red oil, and other sulforicinates)	1,516	755	.50				1,516	755	.50			
Soap and toilet preparations	72,365	270,778	3.74							72,365	270,778	3.74
Photographic and projection goods	4,470	12,325	2.76				3,684	3,624	.98	786	8,701	11.07
Scientific and professional instruments, apparatus, and supplies	7,690	40,708	5.29							7,690	40,708	5.29
Musical instruments	481,979	303,550	.63	302,011	128,980	.43	179,968	174,570	.97			
Phonographs, gramophones, motion picture projectors, and similar apparatus	302,011	128,980	.43	302,011	128,980	.43						
Musical apparatus such as music boxes, barrel organs, aristons, etc., and parts	179,968	174,570	.97				179,968	174,570	.97			
Miscellaneous office supplies	401	407	1.01				352	212	.60	49	195	3.98
Toys, athletic, and sporting goods (toys)	624	662	1.06				270	192	.71	354	470	1.33
Firearms, ammunition, and fireworks	637	6,684	10.49							637	6,684	10.49
Books, maps, pictures, and other printed matter	28,522	27,937	.98	3,134	868	.28	2,844	2,429	.85	22,544	24,640	1.09
Clocks and watches	299,506	8,884,132	29.66							299,506	8,884,132	29.66
Finished watch movements	233,622	6,391,225	27.36							233,622	6,391,225	27.36
Art works	17,077	75,007	4.39							17,077	75,007	4.39
Jewelry	186	6,251	33.61							186	6,251	33.61
Miscellaneous, n. e. s.	15,116	19,929	1.32				1,385	767	.55	13,731	19,162	1.40

Digitized by Google

TABLE 20.—*Switzerland: Selected Imports from North America by Commodity Groups and Value-per-Pound Ranges, 1938*

[Shipping weight in pounds; value in dollars.]

Commodity group	Total			25 cents to 49 cents per pound			50 cents to 99 cents per pound			$1.00 and over per pound		
	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound
North America, Switzerland's selected imports from, total	9,183,021	5,789,294	$0.63	5,167,432	1,810,915	$0.35	2,757,359	1,651,664	$0.60	1,258,230	2,326,715	$1.85
Meat products (foie gras or liver paste)	54,518	18,494	.34	54,518	18,494	.34						
Hides and skins, raw, except furs (calf, kip, and sheep skins)	14,765	67,199	4.55							14,765	67,199	4.55
Leather	340,169	458,519	1.35	70,406	30,228	.43	34,715	24,992	.72	235,048	403,299	1.72
Leather manufactures	21,237	25,259	1.19	10,008	4,906	.49	2,005	1,085	.54	9,224	19,268	2.09
Furs and manufactures	3,429	23,785	6.94							3,429	23,785	6.94
"Other" inedible animals and animal products (wax goods, except candles)	2,195	945	.43	2,195	945	.43						
Table beverages (coffee, processed, not decaffeinated, roasted)	1,501	498	.33	1,501	498	.33						
Sugar and related products (confectionery and sweetmeats)	15,248	4,876	.32	15,248	4,876	.32						
Beverages, n. e. s. (brandy)	33	26	.79				33	26	.79			
Rubber and manufactures	1,342,068	432,326	.32	1,189,844	330,252	.28	151,469	100,642	.66	755	1,432	1.90
Hose and tubes with internal layer of metal or tissue	1,112,058	307,702	.28	1,112,058	307,702	.28						
Drugs, herbs, leaves, and roots, crude	44,230	19,882	.45	44,230	19,882	.45						
Tobacco and manufactures	121,687	109,005	.90				120,962	106,377	.88	725	2,628	3.62
Cigarettes	116,828	103,723	.89				116,828	103,723	.89			
Cotton semimanufactures (yarn)	5	5	1.00							5	5	1.00
Cotton manufactures	26,341	39,232	1.49				7,307	5,496	.75	19,034	33,736	1.77
Vegetable fibers and manufactures	16,366	16,136	.99				16,004	15,374	.96	362	762	2.10
Wool semimanufactures (yarn)	17	24	1.41							17	24	1.41
Wool manufactures	1,760	4,981	2.83							1,760	4,981	2.83
Hair and manufactures (horse and buffalo hair, raw)	49,489	24,903	.50				49,489	24,903	.50			
Silk and manufactures	136,870	105,596	.77	123,352	45,846	.37				13,518	59,750	4.42
Silk waste and defective cocoons	123,352	45,846	.37	123,352	45,846	.37						
Rayon, nylon, and other synthetic textiles	3,123	10,187	3.26							3,123	10,187	3.26
Miscellaneous textile products (chiefly household oilcloth)	43,970	30,882	.70	38,561	12,596	.33	126	118	.94	5,283	18,168	3.44
Wood manufactures	11,422	4,837	.42	8,294	3,009	.37	3,128	1,738	.56			
Cork and manufactures	6,001	3,447	.57				6,001	3,447	.57			
Paper, related products and manufactures	24,207	10,484	.43	12,300	3,837	.31	11,907	6,647	.56			
"Other" nonmetallic minerals, including precious	187,413	101,313	.54	107,163	45,768	.43	77,966	47,545	.61	2,284	8,000	3.50
Iron and steel semimanufactures (sheet iron coated with tin, copper or nickel; 3 millimeters or more in thickness)	6,609	2,598	.39	6,609	2,598	.39						
Steel mill manufactures	92,892	35,529	.38	92,892	35,529	.38						
Iron and steel advanced manufactures	279,960	230,872	.82	82,406	27,214	.33	145,390	78,532	.54	52,164	125,126	2.40
Nonferrous ores, metals, and alloys, except precious	197,471	112,838	.57	151,561	57,200	.38	29,158	26,870	.92	16,752	28,768	1.72
Nickel, pure and alloys, rolled or drawn, in slabs, bars, sheets, wire, pipes; also cubes, sponges, cast bars, scrap, and waste	128,759	47,210	.37	128,759	47,210	.37						
Precious metals and plated ware, except jewelry, bullion, and coin	7,202	40,156	5.58							7,202	40,156	5.58
Electrical machinery and apparatus	346,572	327,010	.94	117,002	49,712	.42	61,419	50,057	.82	168,151	227,241	1.35
Radio apparatus	151,267	188,026	1.24							151,267	188,026	1.24
Industrial machinery	2,460,017	1,311,387	.53	778,224	336,681	.43	1,639,831	902,629	.55	41,962	72,077	1.72
Machine tools for working metal, wood, stone, etc.	1,507,057	823,549	.55	11,574	5,535	.48	1,495,483	818,014	.55			
Machinery for the manufacture and processing of foodstuffs	111,440	61,957	.56				111,440	61,957	.56			
Refrigerating machinery	160,950	79,593	.49	154,573	76,265	.49	6,377	3,328	.52			
Office appliances	370,729	616,236	1.66							370,729	616,236	1.66
Cash registers, accounting machines, and parts	102,258	168,708	1.65							102,258	168,708	1.65
Typewriters and parts	224,192	308,790	1.38							224,192	308,790	1.38
Printing and bookbinding machinery	292,236	143,432	.49	252,915	96,862	.38				39,321	46,570	1.18
Printing presses	252,915	96,862	.38	252,915	96,862	.38						
Automobiles and other vehicles	1,676,976	597,177	.36	1,654,896	578,194	.35	14,555	9,951	.68	7,525	9,032	1.20
Automobiles and chassis, including electric motorcars, weighing more than 1600 kilograms (3527 pounds) each, also detached parts	1,630,899	575,445	.35	1,624,006	568,170	.35				6,893	7,275	1.06
Coal-tar products	132,701	50,250	.38	111,178	32,029	.29	21,523	18,221	.85			
Aniline combinations for manufacture of colors, such as toluidin and dimethylaniline, etc.	111,178	32,029	.29	111,178	32,029	.29						
Medicinal and pharmaceutical preparations	143,297	92,220	.64	347	139	.40	140,519	79,864	.57	2,431	12,217	5.03
Industrial chemicals (bromine and salts and iodine and salts)	5,864	1,751	.30	5,864	1,751	.30						
Soap and toilet preparations	125,451	71,406	.57	23,644	6,306	.27	101,807	65,100	.64			
Photographic and projection goods	173,040	314,395	1.82				27,380	18,201	.66	145,660	296,194	2.03
Photographic dry plates of polished glass	118,797	192,911	1.62							118,797	192,911	1.62
Scientific and professional instruments, apparatus and supplies	45,862	83,490	1.82							45,862	83,490	1.82
Musical instruments	31,012	61,978	2.00				95	85	.89	30,917	61,893	2.00
Miscellaneous office supplies	65,500	42,820	.65	6,949	2,227	.32	58,551	40,593	.69			
Toys, athletic and sporting goods (toys)	49,280	17,116	.35	49,280	17,116	.35						
Firearms, ammunition and fireworks	484	915	1.89				88	80	.91	396	835	2.11
Books, maps, pictures, and other printed matter	161,732	50,714	.31	156,045	46,130	.30	4,788	3,418	.71	899	1,166	1.30
Paper, printed or lithographed in loose sheets or pamphlet form	123,808	36,107	.29	123,808	36,107	.29						
Clocks and watches	6,976	20,561	2.95							6,976	20,561	2.95
Art works	976	5,186	5.31							976	5,186	5.31
Jewelry	777	3,677	4.73							777	3,677	4.73
Miscellaneous, n. e. s.	41,341	42,739	1.03				31,143	19,673	.63	10,198	23,066	2.26

Digitized by Google

TABLE 21.—*Switzerland: Selected Imports from Middle America by Commodity Groups and Value-per-Pound Ranges, 1938*

[Shipping weight in pounds; value in dollars.]

Commodity group	Total			25 cents to 49 cents per pound			50 cents to 99 cents per pound			$1.00 and over per pound		
	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound
Middle America, Switzerland's selected imports from, total	106,428	117,272	$1.10	50,899	14,199	$0.28	14,601	13,116	$0.90	40,928	89,957	$2.20
Fruits and preparations (preserves and delicacies)	5	5	1.00							5	5	1.00
Drugs, herbs, leaves, and roots, crude	1,715	1,373	.80				1,715	1,373	.80			
Vegetable oils (essential oils)	73,990	38,449	.52	49,596	13,632	.27	12,864	11,727	.91	11,530	13,090	1.14
Tobacco and manufactures (cigars)	6,355	40,725	6.41							6,355	40,725	6.41
Miscellaneous textile products (hats, and other articles of straw, dyed, printed or ornamented)	30	27	.90				16	13	.81	14	14	1.00
Electrical machinery and apparatus (mercury power rectifiers)	424	179	.42	365	110	.30				59	69	1.17
Industrial machinery (paper-making and paper-working machines)	938	457	.49	938	457	.49						
Medicinal and pharmaceutical preparations	4	6	1.50							4	6	1.50
Soap and toilet preparations	6	3	.50				6	3	.50			
Scientific and professional apparatus and supplies (astronomical)	119	1,507	12.66							119	1,507	12.66
Musical instruments (phonographs, gramophones, motion-picture projectors, and similar apparatus)	34	50	1.47							34	50	1.47
Clocks and watches	100	2,486	24.86							100	2,486	24.86
Art works (prints other than photographs, not framed)	5	5	1.00							5	5	1.00
Miscellaneous, n. e. s. (sponges)	22,703	32,000	1.41							22,703	32,000	1.41

TABLE 22.—*Switzerland: Selected Imports From South America by Commodity Groups and Value-per-Pound Ranges, 1938*

[Shipping weight in pounds; value in dollars.]

Commodity group	Total			25 cents to 49 cents per pound			50 cents to 99 cents per pound			$1.00 and over per pound		
	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound
South America, Switzerland's selected imports from, total	1,523,835	512,214	$0.34	1,448,804	420,397	$0.29	34,949	22,094	$0.63	40,082	69,723	$1.74
"Other" edible animal products (meat extracts, solid or liquid)	625,556	162,416	.26	625,556	162,416	.26						
Hides and skins, raw, except furs (calf, kip, and sheep skins)	7,382	11,295	1.53							7,382	11,295	1.53
Leather	161,662	58,135	.36	134,112	41,375	.31	27,550	16,760	.61			
Sole leather, butts	134,112	41,375	.31	134,112	41,375	.31						
Leather manufactures	15	11	.73				15	11	.73			
Fruits and preparations (preserves and delicacies)	19	16	.84				19	16	.84			
Sugar and related products (confectionery and sweetmeats)	255	99	.39	255	99	.39						
Drugs, herbs, leaves, and roots, crude	3,312	1,862	.56	1,501	417	.28	1,811	1,445	.80			
Vegetable oils (essential oils)	16,454	15,862	.96				3,532	2,737	.77	12,922	13,125	1.02
Tobacco and manufactures (cigars)	17,637	25,322	1.44							17,637	25,322	1.44
Cotton manufactures (fabrics)	89	51	.57				89	51	.57			
Wool, unmanufactured (raw, scoured, dyed)	281,936	85,607	.30	281,936	85,607	.30						
Wool manufactures	13	32	2.46							13	32	2.46
Hair and manufactures	399,314	128,580	.32	397,613	127,642	.32	1,701	947	.56			
Horse and buffalo hair, raw	397,613	127,642	.32	397,613	127,642	.32						
Rayon, nylon, and other synthetic textiles (fabrics of artificial silk, printed)	5	6	1.20							5	6	1.20
Miscellaneous textile products	513	2,360	4.60	50	24	.48				463	2,336	5.05
"Other" nonmetallic minerals including precious (precious, semiprecious and synthetic stones not set, except garnets, sapphires, and rubies for watchmakers' use)	[1]	686	[2]							[1]	686	[2]
Iron and steel advanced manufactures	5	4	.80				5	4	.80			
Nonferrous ores, metals, and alloys, except precious (goods of copper and alloys)	4	7	1.75							4	7	1.75
Electrical machinery and apparatus (electric dynamos and transformers)	4,999	1,944	.39	4,999	1,944	.39						
Industrial machinery	2,880	1,106	.38	2,720	846	.31				160	260	1.63
Medicinal and pharmaceutical preparations	1,025	11,360	11.08				16	13	.81	1,009	11,347	11.25
Soap and toilet preparations	122	170	1.39							122	170	1.39
Scientific and professional instruments, apparatus and supplies (surgical and medical)	3	7	2.33							3	7	2.33
Musical instruments (phonographs, gramophones, motion-picture projectors, and similar apparatus)	34	42	1.24				13	10	.77	21	32	1.52
Books, maps, pictures, and other printed matter	260	127	.49	62	27	.44	198	100	.51			
Clocks and watches	327	5,081	15.54							327	5,081	15.54
Miscellaneous, n. e. s.	14	17	1.21							14	17	1.21

[1] Less than one-half the unit.
[2] Not available.

Digitized by Google

TABLE 23.—*Switzerland: Selected Imports From Africa by Commodity Groups and Value-per-Pound Ranges, 1938*

[Shipping weight in pounds; value in dollars.]

Commodity group	Total			25 cents to 49 cents per pound			50 cents to 99 cents per pound			$1.00 and over per pound		
	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound
Africa, Switzerland's selected imports from, total	1,003,607	324,777	$0.32	883,125	243,030	$0.28	117,974	72,117	$0.61	2,508	9,630	$3.84
Hides and skins, raw, except furs (calf, kip, and sheep skins)	10,173	6,488	.64	2,543	1,034	.41	7,630	5,454	.71			
Leather manufactures (boots, shoes, and slippers of leather)	3	7	2.33							3	7	2.33
Table beverages (tea)	17,967	5,268	.29	17,967	5,268	.29						
Sugar and related products (confectionery and sweetmeats)	45	17	.38	45	17	.38						
Vegetable oils	103,799	65,344	.63				101,650	61,803	.61	2,149	3,541	1.65
Essential oils	101,650	61,803	.61				101,650	61,803	.61			
Cotton manufactures (fabrics)	9	11	1.22							9	11	1.22
Vegetable fibers and manufactures	2,819	1,217	.43	2,791	1,066	.38				28	151	5.39
Wool, unmanufactured (raw, scoured, dyed)	859,589	235,554	.27	859,589	235,554	.27						
Wool manufactures	10	28	2.80							10	28	2.80
Miscellaneous textile products	1,808	999	.55				1,805	985	.55	3	14	4.67
Wood manufactures (cabinet-makers' goods)	160	77	.48	160	77	.48						
"Other" nonmetallic minerals including precious (precious, semiprecious and synthetic stones not set, except garnets and rubies for watchmakers' use)	6,873	3,865	.56				6,873	3,865	.56			
Precious metals, and plated ware, except jewelry, bullion, and coin (silversmiths' goods)	3	19	6.33							3	.19	6.33
Electrical machinery and apparatus (electric meters)	30	14	.47	30	14	.47						
Industrial machinery (gas meters)	3	26	8.67							3	26	8.67
Office appliances (calculating machines)	31	149	4.81							31	149	4.81
Medicinal and pharmaceutical preparations	7	10	1.43							7	10	1.43
Scientific and professional instruments, apparatus and supplies (astronomical)	143	1,857	12.99							143	1,857	12.99
Musical instruments (phonographs, gramophones, motion-picture projectors, and similar apparatus)	13	29	2.23							13	29	2.23
Clocks and watches	106	3,788	35.74							106	3,788	35.74
Miscellaneous, n. e. s.	16	10	.63				16	10	.63			

TABLE 24.—*Switzerland: Selected Imports From Asia, by Commodity Groups and Value-per-Pound Ranges, 1938*

[Shipping weight in pounds; value in dollars.]

Commodity group	Total			25 cents to 49 cents per pound			50 cents to 99 cents per pound			$1.00 and over per pound		
	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound
Asia, Switzerland's selected imports from, total	8,774,457	5,270,165	$0.60	6,285,170	2,322,756	$0.37	1,289,061	907,882	$0.70	1,200,226	2,039,527	$1.70
"Other" edible animal products (albumen)	37,499	15,700	.42	37,499	15,700	.42						
Hides and skins, raw, except furs (calf, kip, and sheep skins)	5,856	8,309	1.42							5,856	8,309	1.42
Leather	8,108	4,307	.53	5,190	1,552	.30	2,918	2,755	.94			
Leather manufactures	27	49	1.81							27	49	1.81
Furs and manufactures	162	1,341	8.28							162	1,341	8.28
"Other" inedible animals and animal products (beeswax, manufactured)	2,789	686	.25	2,789	686	.25						
Vegetables and preparations (condensed soups, solid or liquid)	651,086	213,177	.33	651,086	213,177	.33						
Fruits and preparations (preserves and delicacies)	121	43	.36	121	43	.36						
Table beverages (tea)	1,968,710	682,085	.35	1,956,238	675,748	.35	12,472	6,337	.51			
Sugar and related products (confectionery and sweetmeats)	140	38	.27	140	38	.27						
Rubber and manufactures (chiefly rubber threads for weaving elastic bands)	26,402	11,250	.43	26,402	11,250	.43						
Drugs, herbs, leaves, and roots, crude	13,755	22,668	1.65	1,453	484	.33				12,302	22,184	1.80
Vegetable oils	570,912	225,110	.39	547,861	202,793	.37	16,783	10,016	.60	6,268	12,301	1.96
Essential oils	562,495	212,088	.38	545,712	202,072	.37	16,783	10,016	.60			
Tobacco and manufactures (cigars)	2,733	4,872	1.78							2,733	4,872	1.78
Cotton manufactures	500,124	311,516	.62	52,704	18,935	.36	441,896	276,674	.63	5,524	15,907	2.88
Fabrics	492,661	294,619	.60	52,704	18,935	.36	439,954	275,680	.63	3	4	1.33
Vegetable fibers and manufactures	39,402	47,478	1.20	32,831	14,564	.44				6,661	32,914	4.94
Wool manufactures	378,998	371,328	.98	2,034	830	.41	108,306	77,325	.71	268,658	293,173	1.09
Carpets and rugs	378,986	371,280	.98	2,034	830	.41	108,306	77,325	.71	268,646	293,125	1.09
Hair and manufactures	61,678	66,851	1.08	1,884	780	.41	53,764	49,918	.93	6,030	16,153	2.68
Hog bristles, assorted and in bunches	59,331	63,821	1.08				53,764	49,918	.93	5,567	13,903	2.50
Silk and manufactures	1,130,627	1,447,553	1.28				467,655	348,829	.75	662,972	1,098,724	1.66
Raw silk, unbleached, not thrown	637,809	1,051,500	1.65							637,809	1,051,500	1.65
Silk waste and defective cocoons	135,997	67,646	.50				135,997	67,646	.50			
Combed floss silk	331,658	281,183	.85				331,658	281,183	.85			
Rayon, nylon, and other synthetic textiles	330,871	365,889	1.11	199,782	83,193	.42	1,075	797	.74	130,014	281,899	2.17
Artificial silk fabrics	328,002	355,837	1.08	199,782	83,193	.42	1,075	797	.74	127,145	271,847	2.14
Miscellaneous textile products	330,770	240,236	.73	263,676	81,049	.31	19,993	11,500	.58	47,101	147,687	3.14
Plaits, raw, of cane, straw, osier, etc	263,676	81,049	.31	263,676	81,049	.31						
Hats of straw, seaweed, etc	56,225	153,705	2.73				9,124	6,018	.66	47,101	147,687	3.14
Wood manufactures (cabinet-makers' goods, and basket-makers' goods)	8,600	3,534	.41	6,978	2,596	.37	1,622	938	.58			
Paper, related products, and manufactures	3,037	1,196	.39	3,037	1,196	.39						

Digitized by Google

TABLE 24.—*Switzerland: Selected Imports From Asia by Commodity Groups and Value-per-Pound Ranges, 1938—Continued*

[Shipping weight in pounds; value in dollars.]

Commodity group	Total			25 cents to 49 cents per pound			50 cents to 99 cents per pound			$1.00 and over per pound		
	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound
Glass and glass products (white, polished glass, except photographic dry plates or watch glasses)	25	16	$0.64				25	16	$0.64			
"Other" nonmetallic minerals, including precious (chiefly precious, semiprecious and synthetic stones of all kinds, not set)	3,955	16,867	4.26				2,494	1,305	.52	1,461	15,562	$10.65
Iron and steel advanced manufactures (files, rasps, and other tools and instruments)	1,778	737	.41	1,778	737	$0.41						
Nonferrous ores, metals, and alloys, except precious	2,384,862	967,370	.41	2,383,787	966,714	.41	1,075	656	.61			
Tin in bars, pigs and slabs	2,381,833	966,096	.41	2,381,833	966,096	.41						
Electrical machinery and apparatus	2,677	3,202	1.20				184	140	.76	2,493	3,062	1.23
Industrial machinery	1,782	1,145	.64	96	32	.33	1,660	971	.58	26	142	5.46
Office appliances	271	331	1.22				217	137	.63	54	194	3.59
Coal-tar products (colors from aniline, anthracene, and naphthalene, and coal-tar colors)	309	229	.74				309	229	.74			
Medicinal and pharmaceutical preparations	32,924	39,298	1.19				13	10	.77	32,911	39,288	1.19
Industrial chemicals (bromine and salts and iodine and salts)	1,093	1,170	1.07							1,093	1,170	1.07
Soap and toilet preparations	1,896	1,358	.72	11	5	.45	1,807	1,248	.69	78	105	1.35
Scientific and professional instruments, apparatus and supplies	4,564	3,262	.71	306	115	.38	3,955	2,359	.60	303	788	2.60
Musical instruments (phonographs, gramophones, motion-picture projectors, and similar apparatus)	423	308	.73				371	244	.66	52	64	1.23
Miscellaneous office supplies	1,925	650	.34	1,925	650	.34						
Toys, athletic and sporting goods (toys)	117,178	38,382	.33	103,848	29,082	.28	13,330	9,300	.70			
Firearms, ammunition and fireworks (arms, finished)	16	11	.69				16	11	.69			
Books, maps, pictures, and other printed matter (printed books and stamps for collectors)	5,152	3,234	.63	1,714	807	.47	2,539	1,456	.57	899	971	1.08
Clocks and watches (chiefly watch cases, rough or finished, of base metal, silvered, gilded or not)	3,394	28,838	8.50							3,394	28,838	8.50
Jewelry	898	8,083	9.00							898	8,083	9.00
Miscellaneous, n. e. s.	136,838	110,458	.81				134,582	104,711	.78	2,256	5,757	2.55
Small wares and fancy articles of all kinds, made of glass, clay, celluloid, etc.	119,468	94,054	.79				119,415	93,983	.79	53	71	1.34

TABLE 25.—*Switzerland: Selected Imports from Oceania by Commodity Groups and Value-per-Pound Ranges, 1938*

[Shipping weight in pounds; value in dollars.]

Commodity group	Total			25 cents to 49 cents per pound			50 cents to 99 cents per pound			$1.00 and over per pound		
	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound
Oceania, Switzerland's selected imports from, total	7,132,515	2,057,735	$0.29	7,127,738	2,047,979	$0.29	3,312	1,788	$0.54	1,465	7,968	$5.44
Leather manufactures (boots and shoes, of silk, velvet, or plush, with leather soles or leather trimmed)	3	3	1.00							3	3	1.00
Fruits and preparations (preserves and delicacies)	9	7	.78				9	7	.78			
Vegetable oils (essential oils)	3,273	1,758	.54				3,273	1,758	.54			
Wool, unmanufactured (raw, scoured, dyed)	7,112,206	2,042,927	.29	7,112,206	2,042,927	.29						
Wool semimanufactures (wool waste combings)	1,757	771	.44	1,757	771	.44						
Wool manufactures	12	37	3.08							12	37	3.08
Hair and manufactures (horse and buffalo hair, raw)	13,728	4,262	.31	13,728	4,262	.31						
"Other" nonmetallic minerals including precious (precious, semiprecious, and synthetic stones of all kinds, not set)	573	1,823	3.18							573	1,823	3.18
Iron and steel advanced manufactures (oil engines and parts)	8	2	.25	8	2	.25						
Nonferrous ores, metals, and alloys except precious (goods of aluminum and alloys for other than industrial and construction uses)	2	5	2.50							2	5	2.50
Industrial machinery (gas meters)	30	23	.77				30	23	.77			
Scientific and professional instruments, apparatus and supplies (orthopedic)	3	7	2.33							3	7	2.33
Musical instruments (phonographs, gramophones, motion-picture projectors, and similar apparatus)	6	9	1.50							6	9	1.50
Toys, athletic and sporting goods (toys)	738	2,256	3.06							738	2,256	3.06
Books, maps, pictures, and other printed matter (printed books and stamps for collectors)	39	17	.44	39	17	.44						
Clocks and watches	126	3,825	30.36							126	3,825	30.36
Art works	2	3	1.50							2	3	1.50

Digitized by Google

TABLE 26.—*Switzerland: Selected Imports from U. S. S. R. by Commodity Groups and Value-per-Pound Ranges, 1938*

[Shipping weight in pounds; value in dollars.]

Commodity group	Total			25 cents to 49 cents per pound			50 cents to 99 cents per pound			$1.00 and over per pound		
	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound
U. S. S. R., Switzerland's selected imports from, total	155,909	433,916	$2.78	92,307	32,195	$0.35	19,234	10,661	$0.55	44,368	391,060	$8.81
Hides and skins, raw, except furs (calf, kip, and sheep skins)	57	2,114	37.09							57	2,114	37.09
Furs and manufactures	1,486	2,969	2.00							1,486	2,969	2.00
Fruits and preparations (preserves and delicacies)	21,091	87,764	4.16							21,091	87,764	4.16
Vegetable oils	16,691	7,265	.44	9,873	3,549	.36	6,818	3,716	.55			
Vegetable fibers and manufactures (fabrics of flax)	15,740	6,632	.42	15,740	6,632	.42						
Wool manufactures (carpets and rugs)	11,350	24,494	2.16							11,350	24,494	2.16
Hair and manufactures	74,959	34,314	.46	66,634	21,994	.33				8,325	12,320	1.48
Horse and buffalo hair, raw	66,634	21,994	.33	66,634	21,994	.33						
Precious metals and plated ware, except jewelry, bullion, and coin (platinum, unwrought)	2,051	261,389	127.44							2,051	261,389	127.44
Medicinal and pharmaceutical preparations	12,416	6,945	.56				12,416	6,945	.56			
Books, maps, pictures, and other printed matter (printed books and stamps for collectors)	60	20	.33	60	20	.33						
Art works (prints, other than photographs, not framed)	8	10	1.25							8	10	1.25

TABLE 27.—*Switzerland: Selected Imports From United States by Commodity Groups and Value-per-Pound Ranges, 1938*

[Shipping weight in pounds; value in dollars.]

Commodity group	Total			25 cents to 49 cents per pound			50 cents to 99 cents per pound			$1.00 and over per pound		
	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound
United States, Switzerland's selected imports from, total	8,710,033	5,512,583	$0.63	4,780,756	1,688,453	$0.35	2,695,343	1,617,015	$0.60	1,234,834	2,207,115	$1.79
Hides and skins, raw, except furs (calf, kip, and sheep skins)	13,436	28,084	2.09							13,436	28,084	2.09
Leather	335,241	441,600	1.32	70,406	30,228	.43	34,715	24,992	.72	230,120	386,380	1.68
Leather manufactures	21,080	25,024	1.19	10,008	4,906	.49	2,005	1,085	.54	9,067	19,033	2.10
Furs and manufactures	1,235	10,555	8.55							1,235	10,555	8.55
"Other" inedible animals and animal products (wax goods, other than candles)	2,195	945	.43	2,195	945	.43						
Table beverages (coffee processed, not decaffeinated, roasted)	1,501	498	.33	1,501	498	.33						
Sugar and related products (confectionery and sweetmeats)	15,248	4,876	.32	15,248	4,876	.32						
Beverages, n. e. s. (brandy)	33	26	.79				33	26	.79			
Rubber and manufactures	1,108,275	365,059	.33	957,640	265,077	.28	150,635	99,982	.66			
Hose and tubes with internal layer of metal or tissue	879,854	242,527	.28	879,854	242,527	.28						
Drugs, herbs, leaves, and roots, crude	44,230	19,882	.45	44,230	19,882	.45						
Tobacco and manufactures	121,687	109,005	.90				120,962	106,377	.88	725	2,628	3.62
Cigarettes	116,828	103,723	.89				116,828	103,723	.89			
Cotton semimanufactures (yarn)	5	5	1.00							5	5	1.00
Cotton manufactures	26,224	38,996	1.49				7,307	5,496	.75	18,917	33,500	1.77
Vegetable fibers and manufactures	16,313	16,067	.98				16,004	15,374	.96	309	693	2.24
Wool semimanufactures (yarn)	17	24	1.41							17	24	1.41
Wool manufactures	1,716	4,868	2.84							1,716	4,868	2.84
Hair and manufactures (horse and buffalo hair, raw)	5,813	2,933	.50				5,813	2,933	.50			
Silk and manufactures	136,870	105,596	.77	123,352	45,846	.37				13,518	59,750	4.42
Silk waste and defective cocoons	123,352	45,846	.37	123,352	45,846	.37						
Rayon, nylon, and other synthetic textiles	2,758	9,600	3.48							2,758	9,600	3.48
Miscellaneous textile products (chiefly household oilcloth)	43,970	30,882	.70	38,561	12,596	.33	126	118	.94	5,283	18,168	3.44
Wood manufactures	11,422	4,837	.42	8,294	3,099	.37	3,128	1,738	.56			
Cork and manufactures (soles)	6,001	3,447	.57				6,001	3,447	.57			
Paper, related products and manufactures	24,207	10,484	.43	12,300	3,837	.31	11,907	6,647	.56			
"Other" nonmetallic minerals, including precious	186,216	100,663	.54	107,163	45,768	.43	76,769	46,895	.61	2,284	8,000	3.50
Iron and steel semimanufactures (sheet iron coated with tin, copper or nickel; 3 mm. or more in thickness)	6,609	2,598	.39	6,609	2,598	.39						
Steel mill manufactures	92,892	35,529	.38	92,892	35,529	.38						
Iron and steel advanced manufactures	274,808	203,356	.74	82,406	27,214	.33	145,390	78,532	.54	47,012	97,610	2.08
Nonferrous ores, metals, and alloys except precious	118,519	82,437	.70	72,609	26,799	.37	29,158	26,870	.92	16,752	28,768	1.72
Precious metals and plated ware except jewelry, bullion, and coin	7,202	40,156	5.58							7,202	40,156	5.58
Electrical machinery and apparatus	345,039	325,393	.94	117,002	49,712	.42	59,969	49,043	.82	168,068	226,638	1.35
Radio apparatus	151,267	188,026	1.24							151,267	188,026	1.24
Industrial machinery	2,440,220	1,301,358	.53	766,650	331,146	.43	1,631,624	898,167	.55	41,946	72,045	1.72
Machine tools for working metal, wood, stone, etc.	1,495,483	818,014	.55				1,495,483	818,014	.55			
Machinery for manufacture and processing of foodstuffs	111,429	61,948	.56				111,429	61,948	.56			
Refrigerating machinery	154,573	76,265	.49	154,573	76,265	.49						

Digitized by Google

TABLE 27.—*Switzerland: Selected Imports From United States by Commodity Groups and Value-per-Pound Ranges, 1938—Continued*

[Shipping weight in pounds; value in dollars.]

Commodity group	Total			25 cents to 49 cents per pound			50 cents to 99 cents per pound			$1.00 and over per pound		
	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound	Shipping weight	Value	Value per pound
Office appliances	370,678	615,870	$1.66							370,678	615,870	$1.66
Cash registers, accounting machines, and parts	102,258	168,708	1.65							102,258	168,708	1.65
Typewriters and parts	224,192	308,790	1.38							224,192	308,790	1.38
Printing and bookbinding machinery	292,236	143,432	.49	252,915	96,862	$0.38				39,321	46,570	1.18
Printing presses	252,915	96,862	.38	252,915	96,862	.38						
Automobiles and other vehicles	1,670,083	589,902	.35	1,654,896	578,194	.35	14,555	9,951	$0.68	632	1,757	2.78
Automobiles and chassis, including electric motorcars, weighing more than 1,600 kilograms (3,527 pounds) each, also detached parts	1,624,006	568,170	.35	1,624,006	568,170	.35						
Coal-tar products	132,701	50,250	.38	111,178	32,029	.29	21,523	18,221	.85			
Aniline combinations for the manufacture of colors, such as toluidin, dimethylaniline, etc.	111,178	32,029	.29	111,178	32,029	.29						
Medicinal and pharmaceutical preparations	142,087	81,679	.57	347	139	.40	140,519	79,864	.57	1,221	1,676	1.37
Industrial chemicals (bromine and salts, iodine and salts)	5,864	1,751	.30	5,864	1,751	.30						
Soap and toilet preparations	125,451	71,406	.57	23,644	6,306	.27	101,807	65,100	.64			
Photographic and projection goods	166,473	308,568	1.85				20,813	12,374	.59	145,660	296,194	2.03
Photographic dry plates of polished glass	118,797	192,911	1.62							118,797	192,911	1.62
Scientific and professional instruments, apparatus and supplies	45,845	83,441	1.82							45,845	83,441	1.82
Musical instruments	31,006	61,969	2.00				95	85	.89	30,911	61,884	2.00
Miscellaneous office supplies	65,500	42,820	.65	6,949	2,227	.32	58,551	40,593	.69			
Toys, athletic, and sporting goods (toys)	39,852	14,259	.36	39,852	14,259	.36						
Firearms, ammunition, and fireworks	484	915	1.89				88	80	.91	396	835	2.11
Books, maps, pictures, and other printed matter	161,732	50,714	.31	156,045	46,130	.30	4,788	3,418	.71	899	1,166	1.30
Paper, printed or lithographed in loose sheets or pamphlet form	123,808	36,107	.29	123,808	36,107	.29						
Clocks and watches	6,952	19,291	2.77							6,952	19,291	2.77
Art works	974	5,183	5.32							974	5,183	5.32
Jewelry	777	3,677	4.73							777	3,677	4.73
Miscellaneous, n. e. s.	41,256	42,673	1.03				31,058	19,607	.63	10,198	23,066	2.26

Appendix

United States Actual Imports by Air From Switzerland July 1944-June 1945

In July 1944, the Bureau of the Census initiated the publication of monthly bulletins showing data on United States imports that moved by air [1]. United States imports by air from Switzerland for the year, July 1944 through June 1945, have been arranged in value-per-pound groups, similar to the value groups used in the material on potential air cargo shown in the main body of this report, and are presented in the following table.

Great care should be used in interpreting these data on actual air cargo from Switzerland, since war conditions prevailed throughout the period. The Civil Aeronautics Board states that only Army Transport Command planes were allowed to operate in this territory, with all cargo certified by the War and State Departments. For these reasons, and because the collection of this material is in its initial stages, the trade shown fails to provide a valid basis for determining either the volume or the level of value per pound of the merchandise that may subsequently be moved by air in more normal times. However, they are given here as the only available data on actual air cargo.

The outstanding feature of actual imports from Switzerland by air for this period is the heavy trade in clocks, watches, and parts which amounted to 56,121 pounds out of a total of 63,776 pounds and $7,646,408 out of a total value of $7,959,527 for all air-borne United States imports from Switzerland. Thus, clocks, watches, and parts accounted for 88 percent and 96 percent, respectively, of total weight and value.

The high average value per pound of $124.80 for all United States imports from Switzerland by air is weighted by the average value of $136 per pound of the clocks, watches, and parts mentioned above. With the exception of four items, all commodities averaged more than $1 per pound.

In volume, as already stated, clocks, watches, and parts form the principal group. The second largest group is composed of leather, rawhide, and parchment manufactures with 3,736 pounds, and of this amount, 3,687 pounds are "straps and strops." These may be watch appurtenances. Explosives and ammunition comprise the only other group of any weight, with 1,500 pounds reported.

United States exports to Switzerland by air for the year, July 1944 to June 1945, amounted to 1,104 pounds (shipping weight), valued at $40,936. Because of the small amount involved, and because the reports on air exports are known to be incomplete, no analysis will be made here of United States air exports to Switzerland.

[1] Detailed information on exports and imports by air from January 1, 1944, to date will be made available on request to the Foreign Trade Division of the Bureau of the Census, Washington, D. C.

Digitized by Google

United States Actual Imports by Air From Switzerland by Value-per-Pound Ranges, July 1944—June 1945

[Shipping weight in pounds; value in dollars.]

Value group and Schedule A class	Shipping weight	Value	Value per pound
Total, all value-per-pound groups	63,776	7,959,527	$124.80
Under 25 cents per pound, total	30	7	.23
Wood manufactures	30	7	.23
4280990 Manufactures of wood or bark	30	7	.23
25 cents to 49 cents per pound, total			
50 cents to 99 cents per pound, total	1,541	775	.50
"Other" vegetable fibers and manufactures, total	4	2	.50
3421200 Straw, sea grass, and grass manufactures	4	2	.50
Precious metals, jewelry, and plated ware, total	37	23	.62
6845900 Jewelry, not gold or platinum	37	23	.62
Explosives, fireworks, and ammunition, total	1,500	750	.50
8695000 Explosives and ammunition	1,500	750	.50
$1.00 and over per pound, total	62,205	7,958,745	127.94
Leather, rawhide and parchment manufactures, total	3,735	71,723	19.20
0691800 Luggage and related articles	14	851	60.79
0692600 Coin purses, change purses, billfolds, etc.	33	1,959	59.36
0699730—0699750 Straps and strops	3,687	68,892	18.69
0699890 Leather wearing apparel	1	21	21.00
Rubber and allied gums and manufactures, total	2	10	5.00
2098900 Soft rubber manufactures	2	10	5.00
Cotton manufactures, total	18	476	26.44
3160600 Handkerchiefs	18	476	26.44
Silk manufactures, total	20	302	15.10
3740400 Silk wearing apparel, not knit or embroidered	10	19	1.90
3770300 Ribbons	1	15	15.00
3770700 Cords and tassels	1	32	32.00
3799900 "Other" silk manufactures	8	236	29.50
Manufactures of rayon or other synthetic textiles, total	1	5	5.00
3860350 Cords and tassels	1	5	5.00
Glass and glass products, total	153	10,355	67.68
5278790 Blown glassware	107	8,476	79.21
5278900 Pressed glass, glassware and manufactures	46	1,879	40.85
"Other" nonmetallic minerals and manufactures (except precious stones and imitations), total	34	737	21.68
5470260 Emery wheels, files and other manufactures of emery and garnet	1	3	3.00
5470270 Wheels of corundum or silicon carbide	33	734	22.24
Precious and semiprecious stones and imitations and industrial diamonds, total	1	415	415.00
5955590 Semiprecious stones, cut, but not set	1	415	415.00
Iron and steel advanced manufactures, total	533	20,871	39.16
6130900 Manicure and pedicure equipment	98	1,825	18.62
6150250 Jewelers' and piercing saws	2	86	43.00
6150470 Pliers, pincers, and nippers	3	145	48.33
6150650 Cutting tools	377	18,437	48.90
6150750 Pipe tools	38	136	3.58
6200990 "Other" iron and steel manufactures	15	242	16.13
Nonferrous metals, except precious, total	140	3,319	23.71
6458900 Manufactures of brass	25	1,209	48.36
6790990 "Other" metal manufactures	115	2,110	18.35
Precious metals, jewelry and plated ware, total	155	3,043	19.63
6835000 Jewelry, gold or platinum	10	236	23.60
6836500 Metal articles, chains, cigar cutters, etc.	36	90	2.50
6845600 Necklaces and chokers	50	729	14.58
6845700 Bracelets	5	115	23.00
6845800 Brooches and clips	1	4	4.00
6850090, 6850190 Metal articles, not gold or platinum	39	1,851	47.46
6900060 "Other" gold manufactures	14	18	1.29
$1.00 and over per pound—Continued			
Electrical machinery and apparatus, total	40	328	$8.20
7090300 Switchboard and distributive apparatus	40	328	8.20
Engines, turbines, and parts, n. e. s., total	269	1,916	7.12
7110010 Steam engine parts	269	1,916	7.12
"Other" machinery, except agricultural, total	288	2,946	10.23
7400700 Jig-boring machine tools	7	111	15.86
7400900 "Other" metal-working machinery and parts	105	908	8.65
7800620 Testing machines	83	289	3.48
7800990 "Other" machines and parts, except agricultural	93	1,638	17.61
Medicinal and pharmaceutical preparations, total	47	119,512	2,542.81
8130540 Urine concentrates and derivatives	45	111,990	2,488.67
8140600 Salts and compounds of gluconic acids, etc.	2	7,522	3,761.00
Industrial chemicals, total	50	197	3.94
8380220 Blackings, powders, liquids and polishing and cleansing creams	50	197	3.94
Scientific and professional instruments, apparatus and supplies, n. e. s., total	99	4,062	41.03
9150180 Microscopes	4	47	11.75
9180210 Integrators, integraphs, planimeters, and map measures	95	4,015	42.26
Books, maps, pictures, and other printed matter, n. e. s., total	432	1,006	2.33
9510310 Etchings, photographs, and drawings	100	634	6.34
9510425 Bound books, not leather bound	300	329	1.10
9510430 Pamphlets	1	3	3.00
9510490 "Other" printed matter	27	35	1.30
9521100 Labels and flaps	1	2	2.00
9530790 Lithographic prints	3	3	1.00
Clocks, watches, clockwork mechanisms, and parts, total	56,121	7,646,708	136.25
9540250 Clocks and clock movements	10	10	1.00
9540330 Standard marine chronometers	172	4,965	28.87
9560000—9560060 Watches and watch movements, without jewels or having only 1 jewel	3,098	94,771	30.59
9560100—9560160 Watches and watch movements, having 1 to 7 jewels	3,075	218,815	71.16
9560200—9560260 Watches and watch movements having 7 to 15 jewels	9,323	1,697,365	182.06
9560300—9560360 Watches and watch movements, having 15 to 17 jewels	13,675	2,719,521	198.87
9560500 Watches and watch movements, having more than 17 jewels	37	2,666	72.05
9570150 Watch assemblies of 2 or more parts joined	166	15,489	93.31
9570200 Watch balance assemblies	24	2,101	87.54
9570250 Other watch assemblies	32	22,312	697.25
9570400—9570500 Watch parts, n. e. s.	3,387	321,881	95.03
9570600 Watch dials	20	947	47.35
9570700 Watch cases, gold or platinum	209	52,258	250.04
9570800—9570900 Watch cases, silver, including enameled and jeweled	714	50,005	70.04
9570950 Watch cases, base metal	20,639	1,580,911	76.60
9580000 Jewels for any movement, mechanism, device, etc.	835	852,221	1,020.62
9590024 Clockwork mechanisms	614	9,579	15.60
9590073, 9590078 Clockwork mechanism parts	91	891	979
Miscellaneous articles, n. e. s., total	67	70,814	1,056.93
9700000 Beads, imitation pearl	6	324	54.00
9790600 Fountain pens and holders, stylographic pens and parts	1	9	9.00
9850600 Plates for printing, other than steel	2	58	29.00
9919900 Articles, the growth, produce or manufacture of U. S. returned	34	70,386	2,070.18
9950000 Household furniture and personal effects, not merchandise	20	22	1.10
9990430 Miscellaneous military equipment and supplies	4	15	3.75

Source: Bureau of the Census; General Imports into the United States by air—Part II Country of Origin by Commodity, July 1944—June 1945.

☆U. S. GOVERNMENT PRINTING OFFICE: 1946—685148—219

Digitized by Google

Documents Room

Industrial Reference Service

U. S. DEPARTMENT OF COMMERCE, HENRY A. WALLACE, *Secretary*
Bureau of Foreign and Domestic Commerce, AMOS E. TAYLOR, *Director*

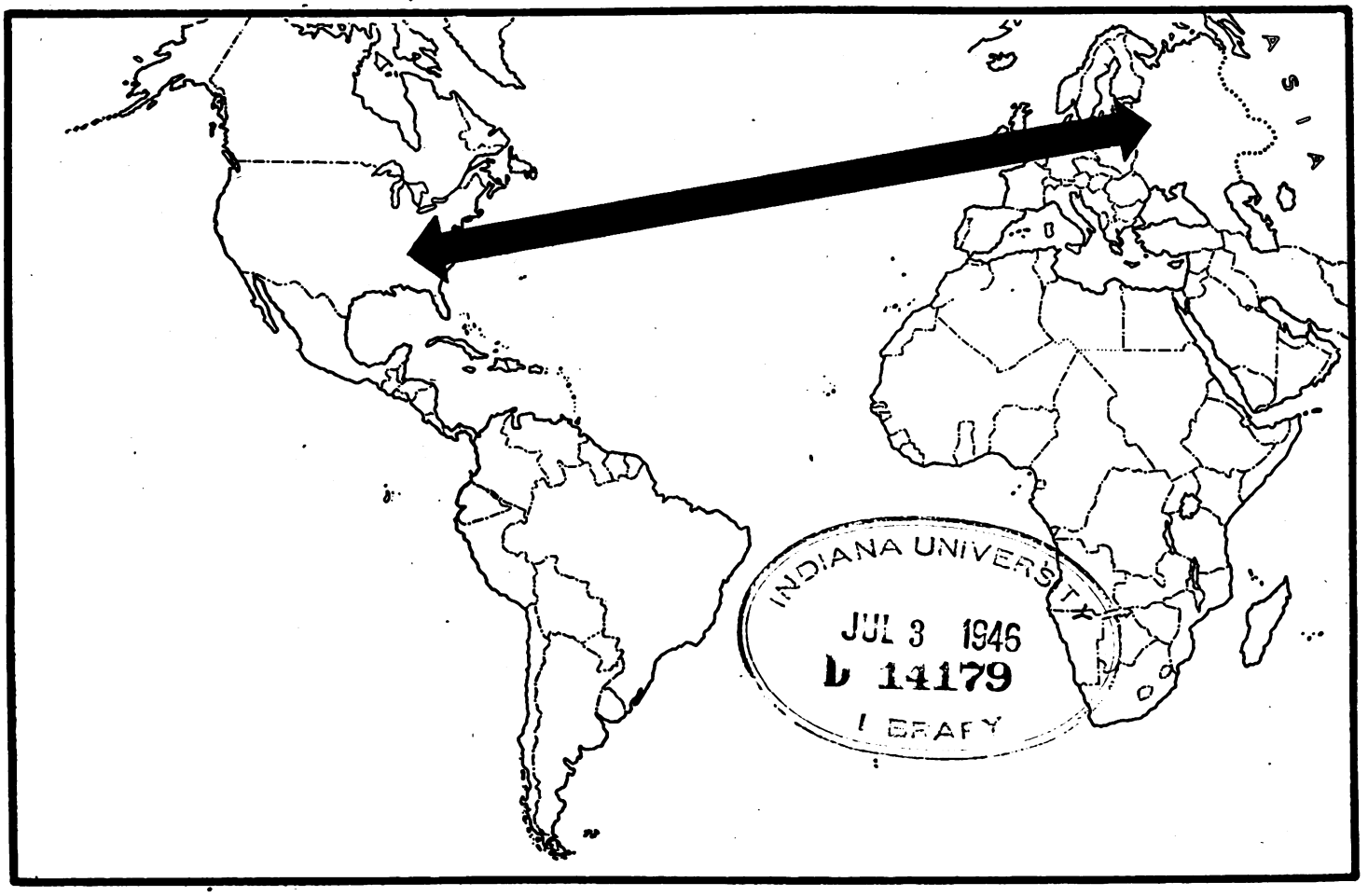
Part 1. TRANSPORTATION and PUBLIC UTILITIES

Available in Parts Covering Selected Services and Commodities
Annual Subscription $1.50. Price this report 5 cents
For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., or any of the Department's Field Offices

Volume 4—Part 1 May 1946 Number 8

Air-Cargo Potentials Between the United States and U. S. S. R. (Russia)

Prepared By James C. Nelson, Chief



Digitized by Google

Air-Cargo Potentials Between the United States and U. S. S. R. (Russia)

By W. Glenna Hackney and Russel A. Romer, Detailed From Civil Aeronautics Board to Transportation Division

The Union of Soviet Socialist Republic, consisting of 16 Republics, occupies most of Eastern Europe, all of Northern Asia, and a considerable portion of Central Asia. The Union of Soviet Socialist Republics, in area (8,819,791 sq. mi.) the largest country in the world, about three times the size of the United States, and one-sixth of the earth's land surface, has a population (estimated 1940) of 192, 693,710 with more than 90 nationalities and languages.

The greater part of the territory of the Soviet Union is a vast low plain broken only occasionally by low mountain ranges of the Urals on the east, the Crimean and Caucasian ranges on the south and southeast in the European portion, and high mountain ranges on the eastern and southern borders of the Asiatic portion. The climate within the U. S. S. R. (comprised of the Arctic country, the forest region, and the agricultural and pastoral regions) is characterized generally by long cold winters and short hot summers.

The Soviet Union has only recently become an industrial-agricultural country. Nearly 65 percent of the population is engaged in cultivation, mainly of cotton, corn, sugar beets, tobacco, grapes, tea, and every type of cereal, vegetable, and fruit. However, only about one-eighth of the land potentially suitable for agriculture (1,037,400 acres, estimated) is under cultivation.

The land contains nearly every material natural resource—minerals of all kinds which include coal, peat, oil, iron ore, manganese, copper, zinc, nickel, tin and lead; and every variety of timber within its 3,124,360 square miles of timber area. The U. S. S. R. ranks second to the United States in petroleum production, fourth in chemical output, and is one of the chief sources of platinum. The U. S. S. R. possesses some of the richest fishing rivers in the world, and is one of the two chief sources of furs. Industry as a whole produced twelve times as much in 1940 as in 1913.

The economic foundation of the U. S. S. R. is the socialist system of economy; that is, State ownership of the means of production, of land, minerals, and other natural resources, banks, transportation, and industrial and commercial enterprises.

The foreign trade of the U. S. S. R. is organized as a State monopoly. Importation and exportation of goods are effected by special licenses issued by the Commissariat for Foreign Trade and regulated in accordance with the country's planned economic system. Soviet foreign trade reached a peak figure in 1930. Some of the principal exports are lumber, oil products, and furs. The principal imports consist of industrial machinery (one-third of imports). From statistics available a trade balance in favor of the United States is indicated.

> Countries on which reports of this series have been issued to date include Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador, Honduras, Mexico, Paraguay, Peru, Union of South Africa, Uruguay, and Venezuela.

Transportation within the U. S. S. R. has been a problem because of the enormous distances involved. The greater part of inland communication is still accomplished by means of animals. No long distance highways exist and roads become seasonally impassable. Railroad development has occurred in the vicinity of large population centers, leaving vast areas untouched. Rivers and seas, which provide an important means of transportation, are frozen from 3 to 9 months of the year.

Great strides have been made in aviation for use as a means of both passenger and freight transport. Civil aviation, besides being an important means of transportation, is put to a variety of other uses in the Soviet Union, namely, sowing of grain in agricultural districts, destruction of insects, patrolling forest lands, aerial map making, animal trapping, and policing of valuable fisheries. Particularly is it used in the Arctic desert and mountainous country where other means of transportation are almost impossible.

Aviation development started in 1932 in the U. S. S. R. and in 1938 the total length of air lines was approximately 68,700 miles. As of December 1945, airfields and sea dromes of all kinds, including military, totaled approximately 11,000.

Background of Series

The appendix contains an explanation of the purpose of this series of reports on air-cargo potentials. It gives a description of the criteria applied in selecting the commodities classified as potentials and mentions a number of points of interest to the users of the reports. It is suggested that readers consult that appendix for the methods used and for factors to be considered in formulating conclusions based on the data contained in any individual report of the series.

In all cases, it should be noted that the statistics in the reports refer to air-cargo *potentials* and not to cargo actually carried by air in 1939. Failure to observe this fact has led to misrepresentation of the figures in the reports on some occasions.

Particular attention should be given to the bases for selection of commodities according to the following categories: Fragility, perishability, and style or obsolescence characteristics. In making these studies, all of the commodities having fragility, perishability, and style or obsolescence characteristics are included under such categories as air-cargo potentials, regardless of value per pound. However, an analysis of the value per pound of individual commodities should nevertheless be made to determine whether all of the items included can properly be considered as potential air cargo under the cost, competition, and equipment conditions of the immediate future.

For instance, it is unlikely that such cargo as cylinder, crown and sheet glass will be shipped in volume by air in the near future in view of a low value of approximately $0.009 per pound. The same consideration might apply to unfilled glassware, which also has a low value per pound, or to other low-priced export and import items classified as fragile, perishable, or as possessing a style characteristic. However, all these commodities have been included in their respective categories for the sake of statistical completeness and because under some conditions they might be shipped by air.

Attention is called also to the schedule of values. These studies, aside from the three special groups, include only articles valued at $0.50 or more per pound. While the higher-valued articles probably would make up the major portion of the air cargoes, especially during the early development of this trade, values as low as $0.25 per pound are being considered in similar studies as indicating potential air-cargo, and some cargo with as low or lower values per pound actually does move by air under present conditions.

Potential Air Cargoes

Trade between the United States and the U. S. S. R. in 1939 consisted of 610 imports and exports with a total

Digitized by Google

value of $76,301,603, according to data compiled from "Foreign Commerce and Navigation of the United States" upon which this study is based. Of that number, 385 were exports valued at $51,807,682 and 225 were imports with a $24,493,921 value.

It may be observed from table 1 that 264, or 43.3 percent, of the total number of items which moved in trade between the two countries in 1939 were selected as having possibilities for air shipment. Those potential air-cargo commodities represent 37.5 percent of the value of the total trade.

One hundred and forty-four of the 264 items considered as possibilities for air shipment are exports. Their shipping weight totals 18,683,515 pounds and they have a value of $11,658,511. Of these air-cargo potential exports, 134 were valued at $0.50 or more a pound, which included 1 perishable and 36 fragile commodities, and 4 items with style or obsolescence characteristics. In addition, 10 exports with values per pound of less than $0.50 were considered as having possibilities for air shipment. These include eight fragile items, one with a style characteristic, and one possessing characteristics of both fragility and style.

Imports considered as air-cargo potentials totaled 120 and had a shipping weight of 5,119,765 pounds and a value of $16,935,420. One hundred and one of those potential air imports had values per pound of $0.50 or more, including 1 perishable and 1 fragile commodity, and 3 items possessing style or obsolescence characteristics. Potential air-cargo imports with values of less than $0.50 a pound totaled 19 commodities and consisted of 6 perishable and 12 fragile commodities, and 1 item with a style factor which possessed a fragile characteristic also.

TABLE 1.—*Potential Air-Cargo Trade between United States and U.S.S.R. in Relation to Total Trade, 1939*

Summary item	Number of commodities	Shipping weight (gross lbs.)	Value
United States trade with the U. S. S. R., total	610	(1)	$76,301,603
United States exports	385	(1)	51,807,682
United States imports	225	(1)	24,493,921
Air-cargo potentials, total	264	23,803,280	28,593,931
United States exports	144	18,683,515	11,658,511
United States imports	120	5,119,765	16,935,420
Percentage of total trade represented by air-cargo potentials	43.3	(1)	37.5
United States exports	37.4	(1)	22.5
United States imports	53.3	(1)	69.1

[1] Not available.

Export Commodities

Exports valued at $0.50 a pound or more amounted to 18,652,783 pounds and had a value of $11,649,107. They comprised almost the entire volume and value of potential air-cargo exports.

The preponderance of volume, value, and number of potential air-cargo exports are in the $0.50 to $0.99 per pound and $1.00 to $1.99 per pound value groups. More than 95 percent (17,765,213 pounds) of the volume and slightly less than 85 percent ($9,843,084) of the value of export items valued above $0.50 a pound occurred in the $0.50 to $0.99 per pound range.

Most of this volume was weighted by articles of machinery, principally milling machines, metal working machinery, metal grinding machines, and stationary and portable engines, both Diesel and semi-Diesel. Other less bulky items, though representing a much lower volume in the $0.50 to $0.99 per pound value class, were abrasive paper and cloth, wire, portable electric tools, ball bearings and parts, roller bearings and parts, measuring meters, and X-ray tubes and parts. The last two mentioned items are considered especially attractive air cargo since they possess the additional feature of fragility.

More than half of the volume and value of the $1.00 to $1.99 value class were comprised of aircraft parts and accessories, scientific laboratory and professional instruments and apparatus, and electrical testing apparatus and parts. The latter two have additional characteristics of fragility which might encourage their shipment by air.

The principal export items in the $2.00 to $2.99 value class were transmitting sets, tubes and parts, and electrical recording instruments. Both possess fragile characteristics.

The $3.00 to $3.99 value class was mainly weighted by the two items, aircraft engine parts and accessories, and aircraft engines.

Motion-picture films and machine-operated metal cutting tools are items of appreciable volume and value in the $4.00 to $4.99 per pound value class. The item, aircraft instruments and parts, which also possesses a fragile characteristic, is the principal air-cargo potential in the $5.00 to $9.99 per pound value range. The items valued at $10.00 or more per pound contributed a relatively small volume to the air-cargo potential exports. Precision scales, balances, and weights averaging $55.51 a pound, and other scales and balances averaging $10.43 a pound, were the principal items in those value classes.

The total weight of export commodities possessing perishable, fragile, or obsolescence characteristics which have values below $0.50 a pound amounted to only 30,732 pounds and were valued at $9,404. Catalogs and pamphlets, an item possessing a style characteristic, comprised most of this volume and value.

Import Commodities

Imports having a value of $0.50 or more a pound totaled 101, with a shipping weight of 4,396,914 pounds and a value of $16,809,444, or 85.9 percent and 99.3 percent, respectively, of the weight and value of potential air-cargo imports. Fur items, ranging from $0.74 to $366 a pound comprised 50 percent of the volume and 75 percent of the total value of those valued above $0.50 per pound.

Slightly less than 50 percent in volume, 2,176,833 pounds, of the air-cargo potential imports valued at more than $0.50 a pound, occurred in the $0.50 to $0.99 value class. The two items, cigarette leaf and undressed hare fur, represented 91.6 percent by weight and 90.3 percent by value of commodities in this value class.

The three commodities, sausage casings, bristles, and sculpture or statuary made up 80.6 percent of the weight and 86.2 percent of the value of group 2, which includes items valued between $1.00 and $1.99 per pound.

The value groups from $2.00 to $4.99 contributed only a relatively small volume and value, (less than 2 percent) to the import air-cargo potential list. Caviar and fish roe and squirrel skins were the items in these groups which occurred in significant volume. Both offer good possibilities for profitable air shipment, owing to relatively high average values.

Air-cargo potential imports in the value range of $5.00 to $9.99 per pound accounted for $9,337,648, or more than half of the total value, and 1,156,197 pounds, more than 20 percent of the total weight. Undressed furs of fox, Persian lamb, marmot, and squirrel, and dressed furs particularly of Persian lamb, comprised much of the weight and value of this value group. Distilled or essential oils was another item in this value range which was imported in appreciable value.

Items valued at more than $10.00 a pound represent less than 5 percent in volume, though more than 25 percent in value of the potential air-cargo

Digitized by Google

imports. Undressed furs of beaver, squirrel, fitch, kolinski, and lynx are all air potentials in the $10.00 to $24.99 value per pound range which were imported in significant value. Santonin and salts, averaging $11.60 per pound, was also an item imported in noteworthy value.

Undressed furs of marten, mink, and sable, averaging $59.72 per pound, $34.37 per pound, and $366.00 per pound, respectively, were imports of significant value in the more than $25 a pound value class, though they represented only a relatively small volume. Platinum ingots, bars, sheets or plates, and iridium were imports of even greater value of this class. Ermine is another item of this class which offers excellent possibilities for air shipment.

Import commodities possessing perishable, fragile, or obsolescence characteristics which have values below $0.50 a pound amounted to 722,851 pounds, and were valued at $125,976. Perishables, which comprised much of the volume of import items valued below $0.50 a pound, were mainly of fish, including whitefish, salmon, and sturgeon.

Cylinder, crown and sheet glass, averaging less than one cent a pound, was the fragile item in the below $0.50 a pound value group imported in largest volume. Table and kitchen articles, and unfilled glassware were other low-valued fragile imports with small possibilities for profitable air shipment. Phonograph, gramophone, or graphophone records, though averaging $0.41 a pound, is a more probable air-cargo item since it possesses both style and fragile characteristics.

Actual Air Shipments

Data on actual air-cargo traffic between the United States and the U.S.S.R., compiled by the Bureau of the Census for some periods in 1944 and 1945 are shown in table 2. These statistics are insufficient, however, to offer an adequate basis for conclusions on the trend or expectancy of future trade. Though the volume of air trade recorded between the United States and the U.S.S.R. is small it is of interest to compare the types of commodities which occurred in the actual air movement with cargo listed in this report as possibly suitable for air shipment.

The United States air exports to the U.S.S.R. from May through September, 1945, totaled 17 commodities, weighed 16,338 gross pounds and were valued at $42,051. The values per pound ranged from 11 cents to $108.62 and averaged $2.57. Most of the commodities (nine) appeared within the $1.00 to $1.99 value per pound group.

Air import data from January 1944 through October 1945 show a total of 14 commodities imported by air from the U.S.S.R. The weight of those imports amounted to 14,903 gross pounds and the value to $5,620,050. The values per pound ranged from $0.02 to $512.09, and in contrast to air exports, averaged $377.11.

TABLE 2.—*Actual Air-Cargo Shipments between the United States and the U.S.S.R. for Specified Months of 1944 and 1945*

[Arranged according to values per pound]

Commodity	Shipping weight (gross pounds)	Value	Value per pound
U. S. Air exports: (May through September 1945)			
Automobile polishes	660	$ 75	$ 0.11
Other industrial chemicals	20	10	.50
Eggs in the shell [1] [2]	4,529	4,000	.88
Jewelry, findings and parts	6,414	6,669	1.04
Other coal-tar intermediates	546	715	1.31
Medicinal chemicals for prescription use (ampoules included) [3]	374	500	1.34
Periodicals, except wastepaper [4]	622	850	1.37
Aluminum foil and leaf	600	900	1.50
Surface coated paper	912	1,500	1.64
Clothing, charity, used, shipped by UNRRA	16	28	1.75
Other office appliances and parts	330	609	1.85
Drugs and biological supplies, charity, private shipment only	507	995	1.96
Surgical, sanitary, and hospital supplies and equipment, private shipment only	283	1,689	5.97
Men's overcoats, suits and pants [4]	12	79	6.58
Automatic pilot for aircraft [1]	84	2,250	26.79
Aircraft instruments and parts [1] [3]	400	18,032	45.08
Aircraft gyro-instruments [1]	29	3,150	108.62
Total	16,338	42,051	($2.57)
U. S. Air imports: (January 1944 through October 1945)			
Aluminum, bauxite crude	452	10	.02
Cheese	300	75	.25
Animal, live [2] [5]	75	100	1.33
Motion-picture film, positive prints [3] [4]	248	526	2.12
Motion-picture film, positive prints, features [4]	78	219	2.81
Books, maps, etc., over 20 years old	96	279	2.91
Explosives, ammunition [3]	255	800	3.14
Motion-picture film, positive prints, newsreels [4]	88	291	3.31
Ermine fur, undressed	144	8,674	60.24
Rose oil or otto of roses	529	121,669	230.00
Palladium	1,186	294,028	247.92
Stamps, stamped envelopes, foreign	8	2,474	309.25
Platinum ingots, bars, etc.	11,296	5,115,116	452.83
Iridium	148	75,789	512.09
Total	14,903	5,620,050	($377.11)

[1] Fragile commodity.
[2] Perishable commodity.
[3] Not elsewhere specified.
[4] Style factor and/or obsolescent commodity.
[5] Not specially provided for.

Many of the air shipments listed in table 2 reflect a wartime necessity for speed. Some of the items, for which there will be no recurring demand, were test and emergency shipments. The markets between the United States and the U.S.S.R. for air-shipped food, with the possible exception of a few luxury items, will soon be nil. The Soviet Union's future food demands will likely be furnished mainly from that country's local supply, though the depletion during the war of certain items necessitates present propagation or supplementation by products from the United States.

For example, eggs have been so shipped to replenish the supply of chicks in the U.S.S.R. Though this item would not contribute appreciably to the volume of air traffic, it evidences a type of emergency demand and also illustrates a particular advantage of air transport. Medicinal chemicals, drugs and biological supplies, and medical supplies represented a significant part of the volume of air exports to the U.S.S.R. and furnishes an indication of the time necessity factor.

It is probable that biologics supplied in the future to the U.S.S.R. will use the air method of shipment, despite low value per-pound, because of the characteristic of perishability. Though aircraft instruments exported by air to the U.S.S.R. during the 5 months of 1945 may have been for military requirements, 1939 surface shipments were much greater. This fact might be an indication of a natural market for those items especially since they possess a fragile characteristic and have values per-pound high enough to warrant air shipment.

Imports of rose oil are able to profitably bear costs of air shipment, since costs of such transportation would comprise only a relatively small part of its average value of $230 a pound. It should be noted, however that Bulgaria is the probable original source of any rose oil exported from the Soviet Union. The amount of this item imported by air will depend on the distributor's preference in maintaining stock, that is whether they find it more practical to keep

Digitized by Google

large reserves on hand or depend on air shipments for filling immediate orders.

The high-valued metals listed as actual air imports may also continue to move by air, though it is expected that the supply of palladium required by the United States from the U.S.S.R. may decrease. Fur items may be expected to provide profitable air-cargo exports in increasing amounts from the Soviet Union. This commodity has a seasonal trade demand which may accentuate the utility of speedy air shipment.

Several of the air-shipped items represent a single shipment, though some were regular shipments. Imports of platinum, palladium, and film were fairly regular air shipments over the 22-month period considered. The appreciable value of rose oil, on the other hand, was imported during a single month. Air-craft items, and drugs and biological supplies, were regular air exports to the U.S.S.R. during the 5-month period considered.

Return Haul Problem

The theoretical relationship of the export and import air-cargo potentials shows a favorable trade balance of 13,563,750 pounds for the United States. The potential air-cargo exports are exceeded in value by the potential air-cargo imports to the extent of $5;276,909.

The value per pound for potential air exports averages $0.62 and for imports, averages $3.31. The bulk of the potential air exports is found in the lowest value class and is comprised mainly of machinery and engines. Whether the Soviet Union program for speed in reconstruction and rehabilitation will demand the importation of those heavy low-valued items of bulk by air shipment is doubtful, though some emergency shipments may be necessary. The elimination of the machinery item would reduce considerably the volume of potential air exports to the U.S.S.R. perhaps to the level of imports considered potential air cargo.

The actual air trade picture indicates a similar relationship between exports and imports. If the data for air imports and exports listed in table 2 were adjusted to allow for the difference in periods covered, the resulting volume balance would favor the exports by a 5 to 1 ratio. The value balance would favor the imports by a ratio of 30 to 1.

It is probable that the trade pattern between the United States and the U.S.S.R. will continue with exports exceeding imports in volume. The problem of securing a greater volume of items for the return air-haul from the U.S.S.R. might be solved by increasing the volume of fur imports and other "luxury" items of the Soviet Union's trade which can bear air transportation costs. As was pointed out earlier, furs comprise 50 percent of the gross poundage and 75 percent of the value of total import air-cargo potentials.

The difference in time saved may accentuate the desirability of shipment by air rather than by surface transport. An air line distance of approximately 5,000 miles from New York City to Leningrad or from San Francisco to Vladivostok could be covered in about 20 hours by a plane flying at the rate of 250 miles per hour, not counting stop-overs. In contrast, a cargo ship will take an average range of 14 to 18 days to cover the distance from New York City to Leningrad via Southampton, England, from New York City to Odessa via Gibraltar and Constantinople, or from San Francisco to Vladivostok via Honolulu.

Summary

The bulk of all goods shipped by the United States to the Union of Soviet Socialist Republics during the war consisted of lend-lease items. Machinery and vehicles comprised the greater portion of Russian imports although sufficient quantities of chemicals, meat products, edible animal fats and oils, dairy and egg products, leather and wool manufactures, as well as industrial raw materials, chiefly petroleum and petroleum products, have been supplied.

Before the war Russia bought from the United States about twice as much as it sold to the United States and it is most likely that this pattern will be followed after the war. If so, it opens a market for manufactured goods for United States producers.

In 1944 the U. S. S. R. received merchandise from the United States valued at $3,458,982,000 or 24.3 percent of total United States exports while the United States imports from U. S. S. R. in that year amounted to $49,698,000 or 1.3 percent of total United States imports. These figures include lend-lease merchandise.

What official policy the Soviet Union will set up, in view of the controlled economy, to procure quick delivery of goods by air for immediate accumulated needs is only conjecture at present. However, it is expected that the Soviet Union's effort to restore and rebuild its shattered industry, particularly in the west and south of European U.S.S.R., will depend upon the urgency and requirements for quick delivery. Items such as machine parts and repair parts for the American-made machinery exported to the U.S. S.R. during the war years will be required for some time.

The long distance between the United States and the U. S. S. R. particularly encourages the shipment of necessity and emergency items by air. Though the cost of a long air-haul will limit the volume of such traffic, there is an appreciable available volume of cargo trade between those countries which can profitably bear air traffic charges.

Data Included in Tables

The accompanying tables give details of the air-cargo potentials itemized and grouped for convenient reference. Table 3 summarizes, by value groups, items valued at $0.50 and more a pound considered to be air-cargo potentials. Table 4 lists perishables, fragile commodities, and those possessing a style factor. The commodities possessing these characteristics have been selected without reference to value per pound, and therefore duplicate to some extent the commodities covered in table 3. Tables 5 through 8 contain itemized lists of the commodities summarized in table 3 and 4, giving their weight, value per pound, and density.

Digitized by Google

TABLE 3.—*United States Trade with U.S.S.R., 1939*

[Summary of commodities valued $0.50 or more per pound]

Category [1]	Commodities			Shipping weight		Value		
	Number	Percent of air-cargo potentials	Percent of total trade	Gross pounds	Percent of air-cargo potentials	Dollars	Percent of air-cargo potentials	Percent of total trade
Exports:								
Group, value per pound:								
1 $0.50 to $0.99	64	44.4	16.6	17,765,213	95.1	9,843,084	84.4	19.0
2 1.00 to 1.99	34	23.6	8.8	522,434	2.8	661,869	5.7	1.3
3 2.00 to 2.99	11	7.6	2.8	153,769	.8	340,931	2.9	.7
4 3.00 to 3.99	10	6.9	2.6	163,555	.9	526,053	4.5	1.0
5 4.00 to 4.99	5	3.5	1.3	12,217	.07	54,925	.5	.1
6 5.00 to 9.99	5	3.5	1.3	34,738	.2	207,684	1.8	.4
7 10.00 to 24.99	4	2.8	1.0	751	(1)	8,677	.07	.02
8 25.00 and over	1	.7	.3	106	(1)	5,884	.05	.01
Total $0.50 or over	134	93.0	34.7	18,652,783	99.8	11,649,107	99.9	22.5
Total air-cargo potentials [2]	144	100.0	37.4	18,683,515	100.0	11,658,511	100.0	22.5
Total exports to U. S. S. R.	385		100.0	(3)		51,807,682		100.0
Imports:								
Group, value per pound:								
1 $0.50 to $0.99	30	25.0	13.3	2,176,883	42.5	1,319,686	7.8	5.4
2 1.00 to 1.99	19	15.8	8.4	806,965	15.8	1,436,126	8.5	5.9
3 2.00 to 2.99	6	5.0	2.7	47,691	.9	124,798	.7	.5
4 3.00 to 3.99	11	9.2	4.9	29,531	.6	108,004	.6	.4
5 4.00 to 4.99	3	2.5	1.3	397	(1)	1,722	.01	(1)
6 5.00 to 9.99	13	10.8	5.8	1,156,197	22.6	9,337,648	55.1	38 1
7 10.00 to 24.99	10	8.3	4.4	[4] 154,465	3.0	2,253,069	13.3	9.2
8 25.00 and over	9	7.5	4.0	24,785	.5	2,228,389	13.2	9.1
Total $0.50 or over	101	84.1	44.8	4,396,914	85.9	16,809,444	99.3	68.6
Total air-cargo potentials [2]	120	100.0	53.3	5,119,765	100.0	16,935,420	100.0	69.1
Total imports from U. S. S. R.	225		100.0	(3)		24,493,921		100.0

[1] Less than 0.01 percent.

[2] Includes, in addition to commodities valued $0.50 per pound and over, those commodities valued less than $0.50 per pound which have been selected because of perishability, fragility, or style factor and/or obsolescence. A commodity which appears under more than one category is accounted for only once in arriving at the total.

[3] Not available.

[4] The shipping weight of one commodity in this group amounts to 0.21 of a pound and has been omitted.

TABLE 4.—*United States Trade with U.S.S.R., 1939*

[Summary of commodities possessing perishability, fragility, or style factor]

Categories	Commodities			Shipping weight		Value		
	Number	Percent of air-cargo potentials [1]	Percent of total trade	Gross pounds	Percent of total air-cargo potentials [1]	Dollars	Percent of total air-cargo potentials [1]	Percent of total trade
Exports, value per pound:								
Perishable commodities (category 2):								
Less than $0.50								
$0.50 or more	1	.7	.3	154	(2)	561	(2)	(2)
Total	1	.7	.3	154	(2)	561	(2)	(2)
Fragile commodities (category 3):								
Less than $0.50	9	6.2	2.3	4,559	.02	1,552	.01	(2)
$0.50 or more	36	25.0	9.4	502,364	2.7	868,714	7.5	1.7
Total	45	31.2	11.7	506,923	2.7	870,266	7.5	1.7
Commodities possessing style factor (category 4):								
Less than $0.50	2	1.4	.5	26,594	.1	8,012	.07	.02
$0.50 or more	4	2.8	1.1	308	(2)	1,003	.01	(2)
Total	6	4.2	1.6	26,902	.1	9,015	.08	.02
Imports, value per pound:								
Perishable commodities (category 2):								
Less than $0.50	6	5.0	2.7	548,433	10.7	114,988	.7	.5
$0.50 or more	1	.8	.4	167	(2)	150	(2)	(2)
Total	7	5.8	3.1	548,600	10.7	115,138	.7	.5
Fragile commodities (category 3):								
Less than $0.50	13	10.8	5.8	174,418	3.4	10,988	.07	.05
$0.50 or more	1	.8	.4	451	(2)	236	(2)	(2)
Total	14	11.6	6.2	174,869	3.4	11,224	.07	.05
Commodities possessing style factor (category 4):								
Less than $0.50	1	.8	.4	13,614	.3	5,531	.04	.03
$0.50 or more	3	2.5	1.3	326	(2)	1,388	(2)	(2)
Total	4	3.3	1.7	13,940	.3	6,919	.04	.03

[1] See table 3 for figures on total air-cargo potentials.

[2] Less than 0.01 percent.

Digitized by Google

TABLE 5.—*United States Trade with U.S.S.R., 1939*

[Group 1 — Commodities valued from $0.50 to $0.99 per pound]

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	EXPORTS				
2031	Rubber boots	34	$ 25	$0.74	(1)
2062	Automobile casings	13,695	8,305	.61	9-16
2209	Crude vegetable drugs	359	325	.91	(1)
3848	Piece goods, wholly or chiefly rayon and other synthetic fibers, knit fabric in the piece	541	316	.58	4
3970	Mattresses, cotton, kapok, moss, and hair	38	19	.50	5
4725	Surface—coated paper	567	455	.80	(1)
5333	Sanitary articles, lavatories, sinks, etc. of pottery	199	103	.52	(1)
5418	Abrasive paper and cloth	52,521	35,224	.67	34-55
5474	Brushes and stock of carbon or graphite	3,704	1,852	.50	30
6060	Tubular products and fittings:	177,089	138,137		
6064	Boiler tubes, seamless	37,578	24,380	.78	(1)
6077	Seamless black pipe, other than casing and oil-line	40,917	31,084	.65	(1)
	All other pipe and fitting			.76	(1)
6156	Tools:	585	351		
6178.9	Crosscut hand, back, and other saws	10,151	10,049	.60	24-30
6303	Other hand tools and parts	155,205	90,389	.99	20-141
6435	Plates, sheets, bars, strips, and rods of aluminum	2,196	2,083	.58	76-110
6630	Insulated copper wire	37,858	34,277	.95	45-80
7011	Nickel chrome electric resistance wire	7,835	3,996	.91	50
	Self-contained lighting outfits			.51	(1)
7027.1	Rotating converters:	42,482	28,888		
7027.2	Under 300 kilowatts	56,689	31,179	.68	(1)
	300 kilowatts and larger			.55	51
7030	Transmission and distribution apparatus:	344	220		
7035 [2]	Feeder voltage regulators	45,509	38,759	.64	15-26
	Watt hour and other measuring meters			.85	37-64
7048	Starting and controlling equipment for:	500,600	250,300		
7049	Industrial motors and parts	1,902	1,027	.50	(1)
7056	Electric railway and vehicle motors and parts	19,268	13,295	.54	(1)
	Portable electric tools			.69	24-140
7064 [2]	Electric incandescent lamps:	91	61		
7065	Other metal filament lamps	772	386	.67	5-12
	Other electric lamps			.50	4-12
7069.1	Electrical appliances:	1,130	599		
7073.5	Electric domestic vacuum cleaners	918	468	.53	8-33
7075.5 [2]	Domestic electric utensils	3,318	2,621	.51	6-11
7095	X-ray apparatus and parts	1,543	1,265	.79	14-60
7142	Sockets, outlets, fuse blocks, lighting switches, and parts	1,071,158	589,137	.82	20
7311	Stationary and portable engines, Diesel and semi-Diesel	33,333	22,000	.55	av. 95
	Rock drills			.66	16-157
7402	Power-driven metal-working machinery:	383,052	199,187		
7406	Turret Lathes	752,985	414,142	.52	21-31
7407	Thread-cutting and automatic screw machines	947,296	511,540	.55	26-35
7408	Knee and column type milling machines	7,368,185	3,831,456	.54	47
7411	Other milling machines	882,024	476,293	.52	47
7441	Gear-cutting machines	942,942	545,716	.54	47
7442	Internal grinding machines	857,842	428,921	.59	31-49
7443	Tool grinding, cutter grinding, and universal grinding machines	1,110,113	843,686	.50	31-49
7455	Other metal grinding machines and parts	1,974,251	1,046,353	.76	31-49
7458	Other power-driven metal working machinery and parts	8,186	4,830	.53	18-49
7471	Other portable and hand or foot operated metal-working machines and parts	1,672	1,538	.59	15-69
7504	Chucks for machine tools	1,984	1,805	.92	42-78
7552	Knitting machines and parts	13,877	8,326	.91	15-46
7590	Sewing machines for factory or industrial use	9,545	5,250	.60	5-37
7691	Cigarette and cigar making and other tobacco machinery and parts	22,208	17,322	.55	(1)
7692	Ball bearings and parts except balls	120,995	93,166	.78	50-120
7767 [2]	Roller bearings and parts except rollers	2,338	2,291	.77	50-120
	Cash register parts			.98	23
7770 [2]	Typewriters:	4,927	4,089		
7772 [2]	New standard	2,040	1,673	.83	19
7774.9 [2]	New portable	587	370	.82	24
7790	Other used	15,152	9,243	.63	20
7795	Typesetting machines for printing and bookbinding	8,208	5,335	.61	av. 23
7921	Other printing and typesetting machinery, parts, and accessories	17,303	15,919	.65	23-55
	Spark plugs for automobiles			.92	av. 49
8025	Coal tar:	3,579	3,298		
8059	Intermediates	7,661	6,915	.92	19-59
9008.2 [2]	Colors, dyes, stains, and color lakes	99	98	.90	19-58
9140	Substandard gage (less than 35 mm.), sound for motion picture projectors	1,475	1,136	.99	14
9210	Photographic apparatus and supplies	1,965	1,157	.77	27
9245	Pianos	432	402	.59	(1)
9297	Percussion band instruments	13	7	.93	2-14
9591 [2]	Musical instrument parts and accessories	58	45	.54	8-18
	Time recording devices and parts			.78	(1)
	Total	17,765,213	9,843,084		
	IMPORTS				
0015 [3]	Chickens, ducks, geese, and guineas, live	167	150	.90	(1)
0709	Furs undressed:	653,659	486,272		
0711.3	Hare	6,039	5,788	.74	av. 17
1203	Lamb and sheep (except caracul and Persian lamb)	673	440	.96	av. 17
2210.52	Dried mushrooms	728	615	.65	(1)
	Lycopodium			.84	(1)
2280.16	Distilled or essential oil, not containing alcohol:	1,763	1,414		
2290.22	Caraway	424	212	.80	(1)
2290.36	Fennel	116,397	82,754	.50	(1)
	Pineneedle			.71	40-50
2605	Tobacco:	1,340,606	704,788		
2623	Cigarette leaf, unstemmed, unmanufactured	2,751	2,737	.53	(1)
3230.7	Cigarettes, manufactured	7,023	4,635	.99	av. 22
	Articles and manufactures of cotton, [4] miscellaneous			.66	(1)
3352.2	Flax household articles:	12,249	6,908		
3352.6	Towels, finished or unfinished, exceeding 120 threads to the sq. in.	1,983	1,124	.56	18-49
3390.29	Napkins, finished or unfinished, exceeding 120 but not 130 threads to the sq. in.	4,702	4,561	.57	48-71
3694.1	Flax manufactures [4]	3,670	1,898	.97	(1)
	Horse mane and tail hair, unmanufactured including switches			.52	26

Digitized by Google

TABLE 5.—*United States Trade with U.S.S.R., 1939 (Continued)*

[Group 1—Commodities valued from $0.50 to $0.99 per pound]—continued

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	EXPORTS—Continued				
4280.99	Manufactures of wood or bark [5]	16,706	$ 10,525	$ .63	(1)
4786	Manufactures of papier maché [4]	3,415	1,844	.54	(1)
4790.06	Albums, photograph, autograph, scrap, post card, postage stamp, and for phonograph records	36	32	.88	30-40
5360.52 [2]	China and porcelain, decorated, colored, etc.	451	236	.52	8-30
6790.07	Bells and parts	249	137	.55	(1)
6790.25	Candlesticks, portable lamps, etc.	115	91	.79	(1)
6790.99	Metal manufactures, not plated with platinum, gold or silver [4]	72	52	.72	(1)
7910.8	Parts of aircraft except engines	78	56	.72	(1)
9410.87	Stuffed animal figures (dolls, toys, and parts), not having a spring mechanism	218	179	.82	(1)
	Parts and fittings for breech-loading:	32	29	.92	(1)
9470.58	Shotguns	30	28	.92	(1)
9470.59	Rifles	57	39	.69	(1)
9510.3	Maps, charts, blank books, slate books, and engravings	11	6	.53	(1)
9510.57	Tourist literature, including maps, charts, text, etc.	890	622	.70	(1)
9530.6	Post cards, (except American views) plain, decorated, or printed except by lithograph process	1,689	1,486	.88	3-24
9800.99	Smokers' articles	2,176,883	1,319,688		
	Total				

See footnotes at end of table.

[Group 2—Commodities valued from $1.00 to $1.99 per pound]

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	EXPORTS				
0647 [6]	Women's and misses' boots and shoes with leather uppers	11	$ 15	$1.36	11
2086	Rubber and balata belting	848	858	1.01	av. 35
3129	Cotton wearing apparel, women's and children's of woven fabric [4]	105	128	1.22	6-22
3140	Cotton woven belting for machinery	567	889	1.57	37
3901	Linoleum	138	148	1.07	(1)
3994	Garters, arm bands, suspenders, and braces	52	54	1.04	av. 17
5990	Precious synthetic and imitation stones, including pearls	15,785	26,834	1.70	8
	Tools:	1,343	1,468	1.09	34
6155.1	Circular saws	2,497	4,319	1.73	30-65
6167	Drills, reamers and counter skins, metal cutting	250	288	1.15	(1)
6191	Sprocket and other power transmission chains				
	Transmission and distribution apparatus:	13,839	24,772	1.79	5-17
7036 [2]	Electrical indicating instruments	92,775	93,703	1.01	(1)
7038 [2]	Other electrical testing apparatus and parts	180	200	1.11	(1)
7075.9 [2]	Therapeutic apparatus and parts				
	Radio apparatus:	10,829	13,536	1.25	7-29
7077 [2]	Receiving sets	6,052	8,957	1.48	11-36
7079 [2]	Receiving-set components				
	Telephone apparatus:	64	120	1.88	50
7083 [2]	Telephone instruments	561	578	1.03	10-60
7087	Other telephone equipment and parts	36,921	37,290	1.01	av. 45
7159	Engine accessories and parts				
	Metal-working machinery:	12,404	13,148	1.06	24-140
7457	Pneumatic portable tools	11,827	15,611	1.32	15-69
7485	Other metal-working machine tools and parts	2,845	5,007	1.76	39
7553	Sewing machine parts	4,381	6,133	1.40	23
7761	Parts for accounting and calculating machines	370	429	1.16	22
7775	Typewriter parts	163,612	250,326	1.53	1-12
7949	Aircraft parts and accessories	6,633	7,959	1.20	23-30
7959	Internal-combustion marine engines	41	42	1.03	25
8127	Tablets, pills, capsules, powders, ointments, and similar manufactures	66	105	1.59	(1)
9008.1 [2]	Motion picture projectors, substandard gage (less than 35 mm.) silent	395	585	1.48	20-28
9010 [2]	Motion picture sound equipment, recording	1,100	$ 1,452	1.32	21
9157	Surgical and medical instruments	288	377	1.31	18-33
9160 [2]	Surveying and engineering instruments	135,567	146,412	1.08	3-87
9190 [2]	Scientific laboratory and professional instruments and apparatus	6	9	1.50	(1)
9440	Ice skates				
	Clocks, not electric:	17	33	1.94	26-40
9572 [2]	Mantel, novelty, and wall	65	84	1.29	17-48
9579 [2]	Other clocks and parts				
	Total	522,434	661,869		
	IMPORTS				
0034	Sheep, lamb, and goat sausage casings	278,642	$ 545,708	$ 1.96	52
0062.2	Fish, dried and unsalted	117	138	1.18	(1)
	Furs, undressed:	4,440	7,500	1.69	av. 1[illegible]
0702	Caracul	21,724	23,122	1.06	av. 17
0721	Pony	11,363	21,013	1.85	av. 17
0727	Wolf, including prairie				
	Furs, dressed:	569	659	1.16	(1)
0733	Hare, not dyed	141	243	1.72	(1)
0737.52	Tails, paws, pieces, etc., dyed	170,676	333,321	1.95	32-40
0917	Bristles, sorted, bunched, or prepared	2,797	2,801	1.00	(1)
0941.7	Isinglass	1,371	2,728	1.99	(1)
1718.3	Compounds containing spirits, beverage	63,555	71,215	1.12	(1)
2290.34	Peppermint, distilled or essential oil, not containing alcohol	1,114	1,352	1.21	48-71
3352.5	Napkins, finished or unfinished, flax, not exceeding 120 threads to the sq. in.	8,894	15,810	1.78	12-22
3660	Carpets and carpeting of wool [4], Oriental, Axminster, Savonneire, Aubusson, and others, not made in a power-driven loom	1,142	1,142	1.00	(1)
4785.1	Boxes of paper, papier maché, or paper board [4] (not covered or lined)	3,041	3,803	1.25	(1)
6740.03	Selenium and salts	33,850	41,974	1.24	(1)
9500	Books and pamphlets printed wholly or chiefly in language other than English	200,870	359,558	1.79	(1)
9620.2	Original sculptures or statuary	2,644	4,019	1.52	(1)
9640.9	Artistic antiquities, works of art	15	15	1.00	(1)
9990.65	Specimens of botany and minerology, not for sale				
	Total	806,965	1,436,126		

See footnotes at end of table.

Digitized by Google

TABLE 5.—*United States Trade with U.S.S.R., 1939 (Continued)*

[Group 3—Commodities valued from $2.00 to $2.99 per pound]

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	EXPORTS				
6454	Pipe fittings and valves	637	$ 1,330	$2.09	28-112
7037 [2]	Electrical recording instruments	28,170	73,805	2.62	25
	Radio apparatus:				
7076 [2]	Transmitting sets, tubes, and parts	118,859	253,170	2.13	9-36
7078 [2]	Radio receiving tubes	4,360	8,764	2.01	9
	Cameras:				
9001 [2]	Motion picture, substandard gage (less than 35mm.)	41	112	2.73	36
9005 [2]	Other than motion-picture	13	31	2.38	av. 40
	Motion-picture film:				
9115	Sensitized, not exposed, positive film, 1 in. or more in width	1,164	2,511	2.16	av. 40
9123.1 [6]	Exposed, positive, features (4,000 linear feet or over)	151	377	2.50	av. 40
9158	Surgical appliances, artificial limbs, crutches, trusses, etc.	259	569	2.20	4-60
9610 [2]	Paintings, etchings, engravings, and statuary	94	200	2.13	(1)
9809	Cast sheets, plates, rods, tubes, and other unfinished products, synthetic resins	21	62	2.95	(1)
	Total	153,769	340,931		
	IMPORTS				
0079	Caviar and fish roe, sturgeon, not boiled	38,240	103,173	2.70	(1)
	Furs, undressed:				
0070	Badger	2,336	5,437	2.33	av. 17
0720	Otter	3,896	8,654	2.22	av. 17
0752.5	Other skins, dyed, fur plates, mats, linings, sacs, stripes, and crosses of	1,204	2,421	2.01	(1)
2210.89	Flowers, fruits, seeds, and all other parts of plants, drugs of vegetable origin, not edible, crude, not containing alcohol [5]	164	429	2.62	(1)
3296.6	Articles or fabrics embroidered, wholly or partly of lace,[5] tamboured, appliqued or ornamented with beads	1,851	4,684	2.53	9-15
	Total	47,691	124,798		

See footnotes at end of table.

[Group 4—Commodities valued from $3.00 to $3.99 per pound]

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	EXPORTS				
0680	Leather belting, new	36	$ 121	$3.36	37
3852 [6]	Dresses, skirts, blouses, and other outerwear, not knit or crocheted	16	53	3.31	10
7075.1 [2]	X-ray tubes	252	976	3.87	2
	Aircraft:				
7946	Engines	50,729	176,536	3.48	10-40
7947	Engine parts and accessories	110,942	342,811	3.09	4-40
8121 [3]	Serums and anti-toxins for human use	154	561	3.65	(1)
9112	Stereopticons, magic lanterns, and other projection apparatus	700	2,435	3.48	(1)
9113	Motion-picture films, sensitized, not exposed, positive less than 1 in. in width	688	2,418	3.51	av.40
9150	Dental instruments	22	82	3.73	13-20
9301	Mechanical pencils of plastic material	16	60	3.75	17-30
	Total	163,555	526,053		
	IMPORTS				
	Furs:				
0722	Raccoon, undressed	4,335	16,732	3.86	av.17
0731	Dog, goat, and kid, not dyed, dressed	2,252	6,775	3.01	(1)
0752.3	Squirrel, dyed, fur plates, mats, linings, sacs, strips, and crosses of	21,426	79,277	3.70	(1)
3761.6	Silk articles or fabrics with threads omitted, drawn, punched or cut	7	27	3.66	10-15
6881.1	Rosaries, chaplets, and similar articles of religious devotion, valued not more than $1.25 per dozen	2	6	3.00	(1)
6900.24	Silver				
6900 39	Sterling, tableware	10	30	3.00	17-43
9025.6 [6]	Other plated ware (except jewelry and cutlery) plated with silver on other metals	46	175	3.77	17-43
9501	Motion-picture film, positive, prints or duplicates, features (4,000 lin. ft. or less)	22	80	3.64	av. 40
9510.44	Books, maps, music, engravings, photographs, etchings, lithographic prints and charts	335	1,034	3.09	(1)
9640.7	Music in books or sheets [4]	476	1,760	3.70	(1)
	Silverware, artistic antiquities, works of art	620	2,158	3.48	12-43
	Total	29,531	108,004		

See footnotes at end of table.

[Group 5—Commodities valued from $4.00 to $4.99 per pound]

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	EXPORTS				
7482	Milling cutters, machine-operated threading dies and taps, and similar machine-operated metal cutting tools	4,789	$ 23,753	$4.96	15-69
9116	Motion-picture film, negative:				
	Sensitized, not exposed, 1 inch or more in width	7,246	30,384	4.19	av. 40
9121.1 [6]	Exposed features (4,000 linear feet or more)	130	558	4.29	av. 40
9125	Cartridge or rolls, other sensitized films, not exposed	39	170	4.36	26
9293 [2]	String instruments	13	60	4.62	2-6
	Total	12,217	54,925		
	IMPORTS				
5724	Salt in bags, sacks, barrels, or other packages	61	298	4.89	(1)
7550.4	Parts of sewing machines	39	186	4.80	39
9025.8	Motion-picture film, positives, prints or duplicates, shorts (4,000 lin. ft. or less)	297	1,238	4.17	av. 40
	Total	397	1,722		

See footnotes at end of table.

Digitized by Google

TABLE 5.—*United States Trade with U.S.S.R., 1939 (Continued)*

[Group 6—Commodities valued from $5.00 to $9.99 per pound]

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	EXPORTS				
7948 [2]	Aircraft instruments and parts	28,905	$ 175,744	$6.08	4-12
9006 [2]	Parts of cameras, except lenses	282	1,688	5.98	([1])
9114	Motion-picture films, sensitized, not exposed, negative, less than 1 inch in width	6	32	5.33	av. 40
9309	Stylographic and fountain pens of plastic materials	25	148	5.92	15
9810	Laminated sheets, plates, rods, tubes, and other unfinished forms of synthetic resin	5,520	30,072	5.45	([1])
	Total	34,738	207,684		
	IMPORTS				
	Furs, undressed:				
0707	Fox, other than silver or black	318,884	1,956,159	6.13	av. 17
0711.2	Persian lamb	538,109	5,164,866	9.60	av. 17
0712	Marmot	140,091	883,047	6.30	av. 17
0725	Squirrel		1,054,439	8.35	av. 17
	Furs, dressed:	126,281			
0734.3	Persian lamb, not dyed	1,827	11,517	6.30	([1])
0734.32	Persian lamb, dyed	19,202	191,780	9.99	([1])
0734.5	Lamb and sheep (except caracul and Persian lamb), not dyed	1,156	6,549	5.67	([1])
0734.52	Lamb and sheep (except caracul and Persian lamb), dyed	1,580	12,490	7.91	([1])
0737.9	Other, not dyed	1,789	14,869	8.31	([1])
0752.4	Other skins, not dyed, fur plates, mats, linings, sacs, strips, and crosses of	838	5,055	6.03	([1])
2290.49	Distilled or essential oils, not containing alcohol	5,303	29,939	5.65	20-50
3696.3	Animal soft hair, unmanufactured, dressed	1,076	6,574	6.11	6-18
6900.25	Silver manufactures [4]	61	364	6.00	([1])
	Total	1,156,197	9,337,648		

See footnotes at end of table.

[Group 7—Commodities valued from $10.00 to $24.99 per pound]

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	EXPORTS				
6086.9	Woven wire screen cloth	41	$ 935	$22.80	([1])
6198	Scales and balances	486	5,069	10.43	([1])
9002.3 [2]	Aerial, studio, photo engraving, coin-operated, and similar types of cameras for professional, scientific, or commercial uses	117	1,499	12.81	17-40
9247	Brass-wind instrument	107	1,174	10.97	6-14
	Total	751	8,677		
	IMPORTS				
	Furs, undressed:				
0701	Beaver	114	1,900	16.67	av. 17
0706	Fitch	63,611	730,077	11.48	av. 17
0710	Kolinski	35,666	700,860	19.65	av. 17
0728.3	Lynx	6,455	136,028	21.07	av. 17
0738	Silver or black fox fur, dressed or undressed [4]	687	12,994	18.91	([1])
0752.2	Squirrel skins, not dyed, fur plates, mats, linings, sacs, strips and crosses of	42,656	609,560	14.29	([1])
6845.9	Jewelry, valued over $5.00 per dozen pieces	0.21	3	14.09	([1])
8129	Santonin and salts	4,953	57,434	11.60	([1])
9025.7 [6]	News reels, motion-picture film, positives, prints or duplicates, shorts (4,000 linear feet or less)	7	70	10.00	([1])
9620.1	Original paintings, pastels, drawings, and sketches	316	4,143	13.10	([1])
	Total	154,465.21	2,253,069		

See footnotes at end of table.

[Group 8—Commodities valued at $25.00 and over per pound]

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	EXPORTS				
6197	Precision scales, balances, and weights for laboratory use	106	$ 5,884	$ 55.51	av. 18
	Total	106	5,884		
	IMPORTS				
	Furs, undressed:				
0705	Ermine	12,543	466,724	37.21	av. 17
0713	Marten	7,782	464,726	59.72	av. 17
0714	Mink	1,941	66,709	34.37	av. 17
0723	Sable	298	109,168	366.00	av. 17
0729.5	Other	39	2,795	71.67	av. 17
5955	Emeralds, cut but not set	2	8,769	4,385.00	([1])
6822	Platinum ingots, bars, sheets, or plates, not less than ⅛ in. thick	1,369	540,437	395.00	([1])
6823	Iridium	497	552,873	1,112.00	([1])
9503.6	Stamps, foreign postage or revenue and foreign Government stamped envelopes or post cards	314	16,188	51.48	8-24
	Total	24,785	2,228,389		

[1] Not available.
[2] Fragile.
[3] Perishable.
[4] Not specially provided for.
[5] Not elsewhere specified.
[6] Style or obsolescence.

Digitized by Google

TABLE 6.—*United States Trade with U.S.S.R., 1939*

[Perishable commodities—category 2]

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	EXPORTS				
8121	Serums and anti-toxins for human use	154	$ 561	$ 3.65	(1)
	Total	154	561		
	IMPORTS				
0015	Chickens, ducks, geese, and guineas, live	167	150	.90	(1)
0025.9	Birds [2], (including game birds)	727	235	.32	(1)
	Fish, whole or beheaded, or eviscerated or both:				
0047	White, fresh or frozen	3,581	508	.14	(1)
0050	Salmon, fresh or frozen	162,697	42,302	.26	(1)
0055.7	Sturgeon, frozen	281,068	61,421	.22	(1)
0056.9	Other	94,092	10,067	.11	(1)
0060.5	Other fish, fresh or frozen, filleted, skinned, boned, sliced or divided [2]	6,268	455	.07	(1)
	Total	548,600	115,138		

[1] Not available.
[2] Not specially provided for.

TABLE 7.—*United States Trade with U.S.S.R., 1939*

[Fragile commodities—category 3]

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	EXPORTS				
5230	"Other" glass	436	$ 96	$ 0.22	(1)
5239	Table glassware [2], plain, cut or engraved	640	32	.05	12-30
5299	"Other" glassware	310	31	.10	(1)
5320	Pottery, table and kitchen articles and utensils	48	23	.48	12-36
5333	Sanitary articles, lavatories, sinks, etc.	199	103	.52	(1)
6197	Precision scales, balances, and weights for laboratory use	106	5,884	55.51	av. 18
6198	Other scales and balances	486	5,069	10.43	(1)
	Transmission and distribution apparatus:				
7035	Watt-hour and other measuring meters	45,599	38,759	.85	37-64
7036	Electrical indicating instruments	13,839	24,772	1.79	5-17
7037	Electrical recording instruments	28,170	73,805	2.62	25
7038	Other electrical testing apparatus and parts	92,775	93,703	1.01	(1)
	Electrical appliances:				
7064	Other metal filament lamps	91	61	.67	5-12
7065	Other electric lamps	772	386	.50	4-12
7067	Flood lights	170	68	.40	8-15
7075.1	X-ray tubes	252	976	3.87	2
7075.5	Other X-ray tubes and parts	3,318	2,621	.79	14-60
7075.9	Therapeutic apparatus and parts	180	200	1.11	(1)
	Radio apparatus:				
7076	Transmitting sets, tubes and parts	118,859	253,170	2.13	9-36
7077	Receiving sets	10,829	13,536	1.25	7-29
7078	Receiving tubes	4,360	8,764	2.01	9
7079	Receiving set components	6,052	8,957	1.48	11-36
7083	Telephone instruments	64	120	1.88	50
7741	Gas meters and parts	315	104	.33	(1)
7742	Water meters and parts	2,090	1,003	.48	(1)
7767	Cash register parts	2,338	2,291	.98	23
	Typewriters:				
7770	Standard, new	4,927	4,089	.83	19
7772	Portable, new	2,040	1,673	.82	24
7774.9	Other, used	587	370	.63	20
7948	Aircraft instruments and parts	28,905	175,744	6.08	4-12
	Cameras:				
9001	Motion picture substandard gage (less than 35 mm.)	41	112	2.73	36
9002.3	Aerial, studio, photo-engraving, coin-operated, and similar types for professional, scientific, or commercial uses	117	1,499	12.81	17-40
9005	Other than motion picture	13	31	2.38	av. 40
9006	Parts except lenses	282	1,688	5.98	(1)
	Motion-picture projectors:				
9008.1	Substandard gage (less than 35 mm.) silent	66	105	1.59	20-28
9008.2	Substandard gage (less than 35 mm.) sound	99	98	.99	14
9010	Motion-picture sound recording equipment	395	585	1.48	(1)
9112	Stereopticons, magic lanterns, and other projection apparatus	700	2,435	3.48	(1)
9160	Surveying and engineering instruments	288	377	1.31	18-33
9190	Scientific laboratory and professional instruments and apparatus	135,567	146,412	1.08	3-87
9242 [3]	Phonograph records	421	160	.38	40
9293	String instruments	13	60	4.62	2-6
	Clocks except electric:				
9572	Mantel, novelty, and wall	17	33	1.94	28-40
9579	Other clocks and parts	65	84	1.29	17-48
9591	Time recording devices and parts	58	45	.78	(1)
9610	Paintings, etchings, engravings, and statuary	94	200	2.13	(1)
9792	Lantern wicks	129	35	.27	9-17
	Total	506,923	870,266		

Digitized by Google

TABLE 7.—*United States Trade with U.S.S.R., 1939 (Continued)*

[Fragile Commodities — Category 3]

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	IMPORTS				
	Cylinder, crown and sheet glass weighing 16-26 ounces per sq. ft., plain:				
5200.66	Not over 150 sq. in.	10,801	$ 74	$0.007	(1)
5200.67	Over 150 and not over 384 sq. in.	53,475	463	.009	(1)
5200.68	Over 384 and not over 720 sq. in.	12,623	123	.01	(1)
5200.69	Over 720 and not over 864 sq. in.	6,172	58	.009	(1)
5200.70	Over 864 and not over 1,200 sq. in.	6,252	51	.008	(1)
	Illuminating articles:				
5273.2	Globes and shades	8,955	985	.11	(1)
5273.3	Wall brackets, candelabras, and candlesticks for electrical illumination	6,069	971	.16	(1)
5273.5	All other	1,536	599	.39	(1)
	Glassware, blown or partly blown:				
5278.3	Table and kitchen articles and utensils (except cut or engraved, valued $1.00 or more each), pressed or otherwise produced, or colored, etched, cut, engraved, etc.	31,200	1,248	.04	(1)
5278.7	Other than bulbs, and table and kitchen articles and utensils (except cut or engraved, valued $1.00 or more each) pressed, or otherwise produced, or colored, etched, cut, engraved, etc.	22,067	665	.03	12-30
	China and porcelain:				
5350.2	Table and kitchen articles and utensils domestic or household ware, decorated, colored, etc.	323	136	.42	(1)
5360.52	All other articles and wares, decorated, colored, etc.	451	236	.52	8-30
5373.7	Earthenware (nonvitrified) and stoneware and manufactures of other articles decorated, colored, etc.	1,331	84	.06	(1)
9220.5 [3]	Phonograph, gramophone, or graphophone records	13,614	5,531	.41	40
	Total	174,869	$11,224		

[1] Not available.
[2] Not elsewhere specified.
[3] Also included within category 4 (style factor).

TABLE 8.—*United States Trade with U.S.S.R., 1939*

[Commodities possessing style factor—category 4]

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	EXPORTS				
0647	Women's and misses' boots and shoes with leather uppers	11	$ 15	$ 1.36	11
3852	Dresses, skirts, blouses, and other outerwear, not knit or crocheted	16	53	3.31	10
	Exposed motion-picture films, features (4,000 linear ft. or over):				
9121.1	Negative	130	558	4.29	av. 40
9123.1	Positive	151	377	2.50	av. 40
9242 [1]	Phonograph records	421	160	.38	40
9516	Catalogs and pamphlets	26,173	7,852	.30	30-40
	Total	26,902	$8,015		
	IMPORTS				
	Motion-picture film positives, prints or duplicates (4,000 linear feet or less):				
9025.6	Features	22	$ 80	$ 3.64	av. 40
9025.7	News reels, shorts	7	70	10.00	(2)
9025.8	Other, shorts	297	1,238	4.17	av. 40
9220.5 [1]	Phonograph, gramophone, or graphophone records	13,614	5,531	.41	40
	Total	13,940	6,919		

[1] Also included within category 3 (fragile).
[2] Not available.

APPENDIX

The volume of air cargo which will move between the United States and foreign countries after the war will depend upon a number of economic factors, such as the comparative speeds, costs, reliability, convenience, and quality of service of air carriers compared with surface carriers. A substantial part of air-cargo tonnage which is likely to move will consist of commodities which previously moved by steamship, while an unknown percentage of future air-cargo shipments will consist of new traffic, especially perishables, made possible by the much faster service offered by air carriers.

In initiating this series of studies, it is believed that an analysis of pre-war trade will furnish some indication of the specific commodities that may be diverted to air carriers in the post-war period. Since the year 1939 is latest period during which United States foreign trade did not show the effects of war, it was decided to use the United States export and import statistics for that year as the basis for study. In studying the thousands of commodities which moved between the United States and U. S. S. R., it was agreed that at least four basic factors are of major importance in determining which should be selected as offering the best prospects for transport by air. These are as follows: (1) Value per pound, (2) perishability, (3) fragility, and (4) style factor, including obsolescence.

It is recognized that no single one of these factors is necessarily of sufficient importance to justify the higher charges which will have to be made for air carriage in comparison with surface transport. It is also evident that a commodity which appears suitable for air carriage on the basis of only one factor is not as likely to go by air as one which is suitable on the basis of two or more factors. For example, a commodity worth $5 per pound which is also perishable, fragile, or possessed of a style factor is more likely to go by air than a commodity

Digitized by Google

equally valuable lacking any of these other favorable characteristics.

In addition to the four major categories covered in this study there are others which merit investigation. Among these may be mentioned economies in packing, insurance, size of shipment, density, and various capital costs. Not all of these have been investigated here because the foreign trade statistics utilized did not lend themselves to such analyses. The experience of the Army and Navy air-transport services during the recent war has demonstrated that substantial packing economies are possible for almost all commodities flown. These economies for certain commodities have reached 70 percent of the total shipping weight, while the average reduction in shipping weight has been reported as approximately 30 percent. A special study of potential packing economies is planned for the commodities included in the four categories shown in this report.

In the past many commodities have been shipped by air to meet emergency situations with little consideration given to cost of service. It is clear that almost any commodity regardless of its economic characteristics may be sent by air under conditions of extreme emergency. Perishable pharmaceuticals and machine tools and parts are classes of commodities which have previously constituted important emergency shipments. Practically all of these are already included in this study because of their high value per pound. In addition to strictly emergency shipments, there will be shipments of odd items for the filling in of inventories where sudden or unexpected increases in demand result in shortages.

Categories Described

In deciding which commodities should be included in the four categories adopted, the question of definition of terms immediately arose, especially in the case of categories 2, 3, and 4 which cover perishability, fragility, and style factor. The bases for selection are briefly described below:

1. Value Per Pound

In determining which commodities should be screened on the basis of value per pound it was necessary to decide first whether net weight or shipping weight should be used, then to decide upon the minimum value per pound, and finally, after a minimum value per pound had been chosen, into how many subclasses the commodities falling above this minimum should be divided.

Since the charges to the shipper are based on gross shipping weights, rather than net weights, it was concluded that such weights were the proper ones to use in an analysis of air-cargo potentials, and they will be used exclusively in each study of the series except the first. The first study covering trade between the United States and Brazil was begun at a time when an adequate body of data on gross shipping weights was not readily available. More recently such data have become available. In the United States-Brazil study, asterisks indicate where net weights are used.

After consultation with various commodity specialists it was decided that all commodities with a value of less than $0.50 per pound should be eliminated from the first category. It was felt that few commodities below that minimum would offer prospects for air carriage in the immediate post-war period. In fact, it is believed that many commodities above $0.50, particularly between $0.50 and $1, offer slight prospects for air-carriage unless additional factors, such as perishability, fragility, or style factor are also involved. A commodity worth $0.50 a pound has a value of $1,000 per ton. If it is assumed that the typical airborne commodity moves 4,000 miles between the United States and South America and that the air-line charge is $0.15 per ton-mile, then the transportation charges on 1 ton would equal $600 or 60 percent of the value of the commodity. A commodity worth $3 a pound has a value of $6,000 per ton. On the basis of the assumptions just stated, air-cargo charges would amount to $600 or only 10 percent of the value of the commodity. These figures may be compared with the analogous relationships for movement of railway freight in the United States. In 1939 railway freight revenue equalled 8.43 percent of the value of all commodities carried.

The commodities valued at $0.50 per pound and over have been divided into eight groups as follows:

Group 1—$0.50-$0.99 per pound.
Group 2—$1-$1.99 per pound.
Group 3—$2-$2.99 per pound.
Group 4—$3-$3.99 per pound.
Group 5—$4-$4.99 per pound.
Group 6—$5-$9.99 per pound.
Group 7—$10-$24.99 per pound.
Group 8—$25 up per pound.

It is evident not only that the commodities in the higher-value groups offer better prospects for air carriage than those in the lower groups, but also that a larger percentage of the commodities in the higher-value groups are likely to go by air. For example, if 2 percent of the commodities in group 1 appear to offer especially good prospects for air carriage it might be expected that 4 percent in group 2, 6 percent in group 3, and so on would offer similar prospects.

2. Perishability

In determining the list of commodities to be included under the second category, perishability, it was necessary first to define the term perishable. It is evident that a large number of commodities would be perishable if a long enough time period and sufficient exposure to the elements were assumed. In deciding whether or not a commodity is perishable when moving in international trade, consideration has been given only to the normal time spent in transit via usual surface methods of transportation, assuming customary packing, handling, and stowage of the commodity. If, for example, apples packed in barrels can be shipped from New York to Rio de Janeiro in 4 weeks, while apples packed in barrels normally do not deteriorate in less than 8 weeks, then apples, for the purposes of this study, will not be considered perishable. It should be pointed out that any commodity which requires refrigerants, special temperature control, or ventilation during the period of movement is also classed as perishable.

In order to determine which of the commodities met the tests of the definition aforementioned, the cooperation of numerous commodity specialists of the Department of Commerce and other Government agencies was secured.

3. Fragility

Fragility, or breakability, is a term which, like perishability, could characterize almost all commodities under certain conditions. For the purposes of this study a commodity is defined as fragile or breakable when special care in handling or special packing is required to avoid damage under normal conditions of shipment. No attempt has been made to classify the commodities selected in respect to differing degrees of fragility.

4. Style Factor

Under the category designated style factor are included all of those commodities which lose their economic value at an exceptionally rapid rate with the passage of time because of a decline in the demand rather than a change in the physical nature of the product. Products which are subject to obsolescence are included. Examples of such are newspapers, motion-picture films, and certain textiles, such as wearing apparel.

Density or Weight

The density or weight per cubic foot of a commodity is one factor affecting the cost of moving commodities. In any transportation vehicle where space rather than weight is the limiting factor, a commodity with a low density costs more per unit of weight to move than one with a higher density, and consequently, must be charged a higher rate per ton-mile. In this series of studies the density is shown where

Digitized by Google

the information is available for all commodities included in the four categories listed above. In some instances, no specific density is shown but instead a density range is given. This indicates a variation in the method of packing. Some commodity classifications, furthermore, cover such a wide range of individual articles lumped together that it is impossible to determine either a *specific* density or a density range. An example of this type of "basket" classification is Export Class No. 0699 (Other Leather Manufactures).

Upon analysis, density appears to be of less importance than the four major criteria already discussed, and, on the basis of new designs for post-war air cargo planes, may become even less significant in the future.

Size of Shipments

The economic and technological characteristics of steamship operations make this form of transportation especially suitable for large shipments of goods weighing many tons. These characteristics are reflected in steamship freight-rate structures which in many instances are quoted in terms of 1 ton or 40 cubic feet. Since it is customary to levy a minimum bill of lading charge, which between the United States and Brazil, for example, amounts to $7.50, as shipments fall below a certain weight, the rate per ton-mile rises progressively so that in the case of shipments of 25 or 50 pounds the rate per ton-mile will be several times that of a shipment weighing 1 ton or more. On such small shipments, therefore, the differences in costs between steamship and air carrier services are reduced to a minimum and air carriers will enjoy their most favorable competitive position.

The only important alternative to the freight services offered by the steamship companies is parcel post, which limits maximum shipments to a few pounds. Frequently, parcel-post charges, when reduced to a rate per ton-mile basis, amount to $0.06 or $0.08 per ton-mile for shipments of 25 to 30 pounds.

It is impossible to determine from published foreign trade statistics what commodities are shipped in quantities weighing less than 1 ton. The figures show the total weight shipped per year for individual commodities, and, in many instances, such shipments total much less than 2,000 pounds but it can not be determined whether these small shipments were shipped individually or consolidated with other commodities in lots weighing 1 ton or more. In recent years it has become increasingly prevalent for producers and freight forwarders to consolidate small shipments into large ones to take advantage of the lower steamship freight rates available on large shipments.

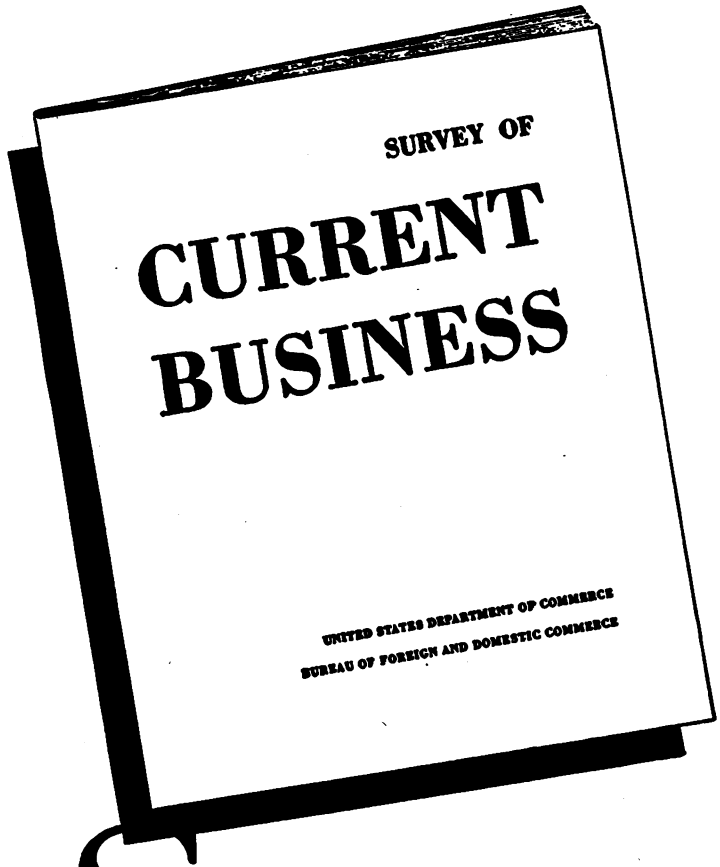
Postwar Air Cargo Rates

Recent estimates of the level of air cargo rates after the war vary from $0.05 to $0.25 per ton-mile. The differences in the estimates are primarily the result of differences in the assumptions on which the forecasts are based or on the completeness of the services under consideration. Some authorities in estimating air cargo rates have in mind airport-to-airport movement only, while others include terminal handling and pick-up and delivery services. Some writers in making postwar predictions are thinking of the period immediately following the cessation of hostilities rather than developments during the first decade. Still others base their predictions upon the assumption that the latest technological improvements will be incorporated into exclusively designed air cargo planes and that these planes will be available shortly after the war.

In the case of air cargo carriage between the United States and U.S.S.R. in the immediate postwar period, air cargo rates per ton-mile will depend upon whether the traffic in both directions is sufficiently large to justify specially designed air cargo planes which carry nothing but commodities. If the volume of traffic should prove to be this large, air cargo rates from airport to airport may prove to be feasible at a level of from $0.10 to $0.15 per ton-mile depending upon the teritory served. If, on the other hand, air cargo volume proves to be so small that it must be carried in aircraft especially designed for the transportation of passengers and mail, then air cargo rates will probably be substantially higher.

☆U. S. GOVERNMENT PRINTING OFFICE: 1946—688653—239

Digitized by Google



$2.00
per year

SURVEY OF CURRENT BUSINESS

THIS AUTHORITATIVE MONTHLY PERIODICAL makes easily available to businessmen over 2,200 comprehensive facts about production, stocks, orders, prices, sales, shipments, etc., of the industries of the United States by means of text, tables, charts, and index numbers.

A sample copy will be sent, on request to the
Bureau of Foreign and Domestic Commerce,
Washington, D. C.

$2.00 per year, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Digitized by Google

Domestic Commerce

written for

BUSINESSMEN . .

• Here is an authoritative monthly periodical written in the language of the American businessman. It is one of the principal organs of the Department of Commerce for disseminating information deemed of importance in maintaining a vigorous and dynamic free enterprise system.

• Domestic Commerce gives the reader an understanding of the progress and changing conditions of industry and business of the United States. Its writers are officials of this and other Government agencies, and specialists in the various subjects covered.

• Particular attention is given to developments in the field of post-war planning.

{ *A sample copy will be sent you upon request to the Bureau of Foreign and Domestic Commerce, Washington 25, D. C.* }

$1.00 per year . . . from the Superintendent of Documents

U. S. GOVERNMENT PRINTING OFFICE • WASHINGTON 25, D. C.

Digitized by Google

Documents Room

Industrial Reference Service

U. S. DEPARTMENT OF COMMERCE, HENRY A. WALLACE, *Secretary*
Bureau of Foreign and Domestic Commerce, AMOS E. TAYLOR, *Director*

Part 1. TRANSPORTATION and PUBLIC UTILITIES

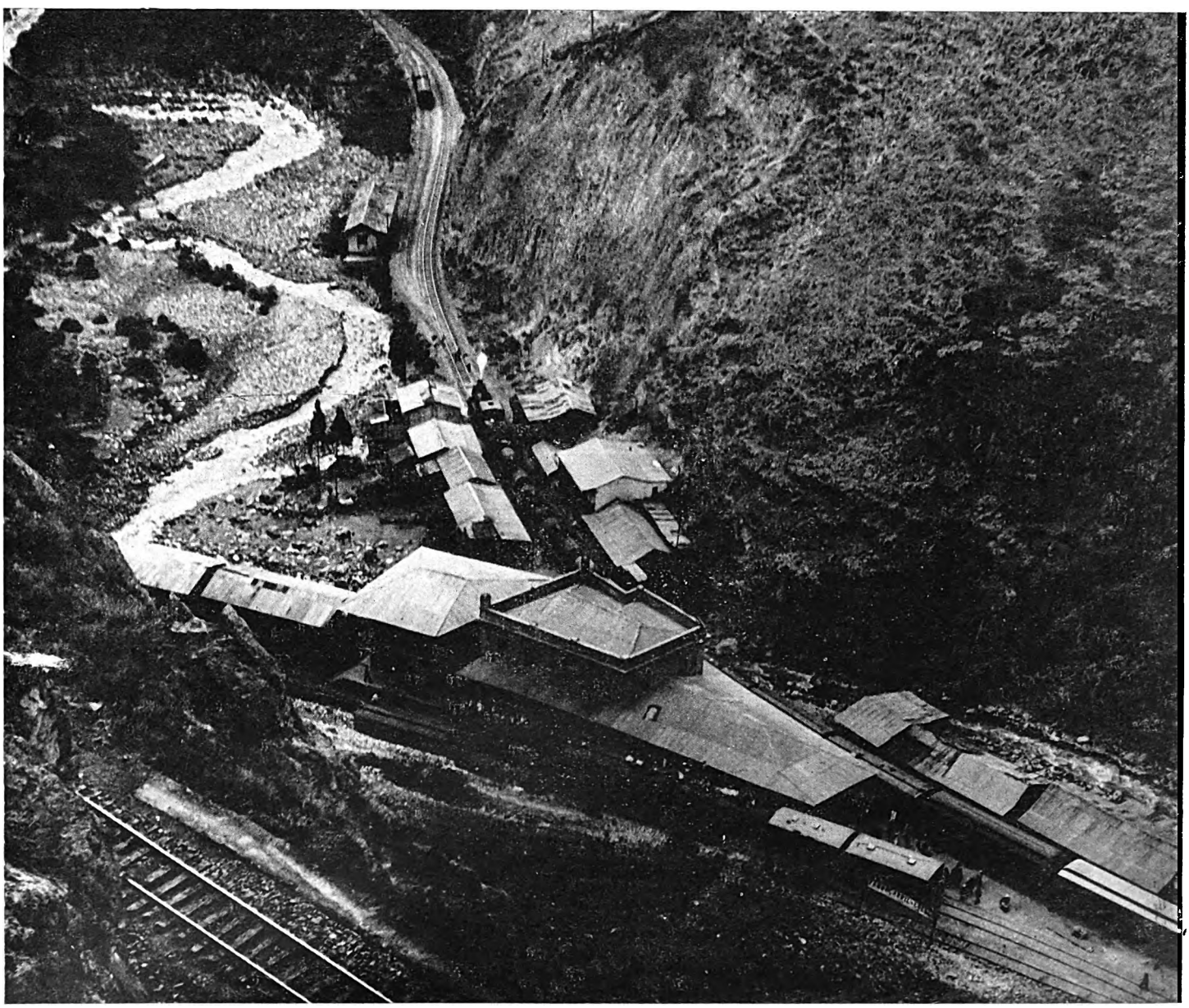
INDIANA UNIVERSITY
JUL 11 1946
LIBRARY

Available in Parts Covering Selected Services and Commodities
Annual Subscription $1.50. Price this report 5 cents
For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., or any of the Department's Field Offices

Volume 4—Part 1 June 1946 Number 9

Railways of Ecuador

Prepared for Publication in the Transportation Unit, James C. Nelson, Chief



Guayaquil—Quito Railroad's famous switchback "Nariz del Diablo" (Devil's Nose). View from top level showing tracks of the first level, and below, the railroad station and valley.

Digitized by Google

Railways of Ecuador

Based on reports by Foreign Service Officers, United States Embassy, Quito, Ecuador, and other governmental data

Astride the equator between Colombia and Peru is located the South American Republic of Ecuador, with an area of approximately 115,830 square miles. In 1945, the population of the Republic was officially estimated at 3,241,311 with densities ranging from 9.4 inhabitants per square mile in the Amazon region to 167.5 inhabitants per square mile in the inter-Andean and coastal lowlands.

Two parallel ranges of the lofty Andes divide the country geographically and economically into three distinct regions with as many varieties of climate, topography, and resources: the coastal, west from the foothills of the Andes to the Pacific Ocean; the Sierra or inter-Andean highlands and plateaus; and the Oriente or Amazon region, eastern slope of the Andes and a small part of the forested Amazon lowlands.

Although geographically located in the tropical zone, the climatic conditions vary from tropical in the eastern and western lowlands, temperate on the intermediate slopes and plateau, to the frigid climate on the lofty peaks of the Andes. There also is a wide variance in the annual rainfall which is usually in excess of 45 inches; the heaviest occurring in the Oriente and the lightest along the western seacoast. The rainy season extends from December to May in the North and from January to May in the South.

Although rich in minerals, agriculture is the Republic's economic mainstay with nearly 80 percent of its people engaged in agricultural pursuits. Notwithstanding the fact that many of its resources lie undeveloped because of inadequate transportation facilities, insufficient capital, and unimproved agricultural farming methods, few nations of similar size are able to produce such a wide variety of products as can Ecuador. Among the more prominent of its agricultural exports have been cocoa, coffee, and fruits, with balsa wood, rice, and rubber rapidly coming to the front.

Foreign trade is the barometer of Ecuador's economic prosperity. Most of its agricultural products are exported while the major portion of consumption goods is imported. Commerce, not only with the United States but also with other nations of the hemisphere, has greatly increased in recent years. The potential possibilities for further development are apparent but such economic progress at present is hindered by its inadequate transportation system and lack of capital for development.

Ecuador needs highways.—In many areas, the foot and mule trails still provide the only means for overland travel. There are very few all weather roads

Prepared by Irma Grace Bate

or highways in Ecuador and these are almost exclusively in the Sierra or inter-Andean highlands area. Other roads serve no more than the limited needs of a specific area isolated from the rest of the country. Despite the fact that it is not yet completed, the Ecuadoran section of the Pan American Highway is by far the most important road in the country. When completed it will run through the entire length of the inter-Andean plateau region from Colombia to the Peruvian border. In normal times, the completed section of this highway furnishes the only effective competition with railway traffic; however, some of this competition is being displaced by the unusually well developed airplane service which is becoming increasingly important.

The Ecuadoran railroads do not adequately serve the country. Nevertheless, they form the backbone of the country's transportation system. With only one line linking the coastal region with the populous inter-Andean highlands area, and only a few short lines of minor importance serving the small coastal ports and their immediate hinterland, further railway development seems of paramount importance to the economic exploitation of the country. On the other hand, this development seems to be an impracticable consideration at the present time since the country's capital is limited. The cost of construction of new lines is prohibitive because of the formidable mountain barriers. Moreover, the railways now in operation appear to be unprofitable undertakings.

Trackage and Ownership

The total trackage of the six common carrier railroads in Ecuador is 1,056 kilometers. They are all single track railways owned and operated by the government.

In addition to the government-owned lines, there are 8 industrial railways owned by various Ecuadoran concerns serving the oil fields and sugar plantations. The total trackage of these lines is not available.

Electrified Lines

There are 21.3 kilometers of electrified street railway in the two cities of Quito and Guayaquil. The Quito line uses 600 volts and the Guayaquil line uses 500 volts of direct current conveyed by overhead trolley.

Physical Characteristics

All lines penetrating the mountainous interior are characterized by severe gradients and curvatures. Heavy rains and torrential streams cause frequent landslides and washouts which increase the cost of roadbed maintenance. Climatic conditions cause considerable deterioration of right of way structures and equipment.

Equipment

There is need for additional equipment and definite need for material for maintenance and major repairs. No facilities exist in Ecuador for the manufacture of railway locomotives, cars, or repair parts, and the facilities of the local foundries must depend on importations of necessary steel equipment.

Differences in Railway Gage

The Ecuadoran railways are of three different gages: 70 percent of them are 1.067 meters, 15 percent 0.75 meters, and 15 percent of 1.435 meters. These differences in gage present no problem since the only three railroads which connect with one another, the Guayaquil and Quito, Siambe-Cuenca, and Quito-Esmeraldas railways, all have the same gage, 1.067 meters. The gages of all the Ecuadoran railways are shown in meters and in feet on the map on page 6.

Ecuadoran Railroad System

The principal railway in Ecuador is the Guayaquil and Quito Railway Company, an American corporation originally organized under the laws of New Jersey and now organized under the laws of Delaware. The Government of Ecuador, by Presidential Decree in June 1944, nationalized this railroad, although no settlement has yet been made with the owners of outstanding bonds, most of which are owned in Britain. The Ecuadoran Government owns a considerable number of these bonds, but no information is obtainable from authoritative sources as to what they now own. Available public statements show over $12,000,000 par value bonds outstanding with accumulated interest amounting to approximately $10,000,000.

By nationalization, the Guayaquil and Quito Railway Company became a part of the Ferrocarriles Ecuatorianos which consists of the Guayaquil and Quito Railway and five smaller roads generally referred to as the Group B Railroads: Ferrocarril Guayaquil-Salinas, Ferrocarril Bahia-Chone, Ferrocarril de El Oro, Ferrocarril Sibambe-Cuenca, Ferrocarril Quito-Esmeraldas.

Practically speaking there is only one railway system of major economic importance in Ecuador — the Guayaquil and Quito Railway Company and the two shorter lines, Ferrocarril Quito-Esmeraldas and Ferrocarril Sibambe-

Digitized by Google

Cuenca. Theoretically, these two shorter lines are independent feeder lines, but actually operate as dependent branch lines. This system extends through the greater part of the inter-Andean highlands region, and furnishes that area with an outlet to the coastal region and the country's chief port, Guayaquil. This system is far more important commercially and economically than all the other railways of Ecuador combined. This importance is based upon several factors: it connects the capital with its leading port; it serves the area containing the largest concentrations of population and connects the principal urban centers in that area; it furnishes the connecting link between the temperate and tropical areas of the country and provides the medium for the interchange of their respective products; and it furnishes the means of supplying the manufacturing establishments of the interior with raw materials, supplies, building materials, and imported machinery or other articles. The importance of these factors is enhanced by the fact that, except for air service (passenger, mail, and express) between Quito and Guayaquil, this railway is the only available transportation facility connecting the two main areas of the Republic.

The fourth most important railway in the country is the Guayaquil-Salinas Railroad which extends from Guayaquil almost due west to the sea coast town of Salinas on Point Santa Elena. It does not connect with the Guayaquil and Quito Railroad lines but it does form an important link in the transportation system since all freight destined for the interior may be transferred by truck and water to the Guayaquil-Quito Railway Company lines at Guayaquil (Alfaro station). This line is the only standard gage line in the country, is wholly owned and operated by the Government, and serves the seaport towns of Salinas and La Libertad, either of which could be developed into a major seaport capable of handling vessels of any tonnage.

The other two railway systems are individual lines belonging to the Government — Ferrocarril Bahia-Chone, and Ferrocarril de El Oro—and are of minor economic importance since they extend only a few miles inland into the immediate hinterland areas near the country's leading port cities.

In addition to these railways, there are 8 short line railways that are not classified as common carriers but as industrial roads serving the sugar plantations, mines, and oil fields. There are also two electric street railways in operation, making a grand total of 16 railways operating in Ecuador at the present time.

Coordination

Road and rail coordination in Ecuador is practically non-existent despite the fact that such coordination would be highly desirable. There is no indication of extensive road-rail coordination planning at present in the sense that merchandise could be carried from one point to another by highway and rail by a single bill of lading. The Sibambe-Cuenca railroad extends south as far as Tambo. Construction is underway to complete it to Cuenca. The Pan American Highway from Loja through Cuenca to Tambo is now completed, making it possible for the Loja area to be serviced in part by highway and in part by rail from the coast. Before the completion of this highway, all commodities transported to the Loja area could be transmitted directly by highway only.

Bus routes. — There are no truck routes operated by the individual railways. The only bus route in Ecuador operated by a railway, Guayaquil and Quito Railway, is that from Quito to Cajabamba, a distance of 205 kilometers. There are no other organized or incorporated highway or passenger transport systems in Ecuador. Passenger busses are operated in the majority of Ecuadoran cities and small towns but they are operated by individuals or informal organizations and are subject to no contracts or systems of operation. Similarly there are a few trucks in interurban service operated in the same manner. The only serious competition that they give the railroads in Ecuador is within a range of 30 or 40 kilometers of Quito.

Train ferries. — The only ferry in Ecuador of any significance is the one crossing the Guayas river from Guayaquil to Alfaro (Duran). This ferry is owned by the Guayaquil and Quito Railway for the transportation of cargo and passengers. The station "Alfaro" in the town of Duran is a terminal point for the railway and the distance across the river between these points is approximately 5 kilometers.

The following information tends to incorporate the most useful data available regarding the common carriers operating in Ecuador showing: (1) a breakdown into operating groups, such as: Government-owned railways, industrial railways, and street railways; (2) the railways no longer in operation; (3) a complete breakdown of the railways giving all pertinent data relative to the operation of the individual lines.

Common Carriers — Ecuadoran Government Railways

Address: Ferrocarriles Ecuatorianos, Calle Bolivar No. 17, Quito, Ecuador.
Ownership: Federal Government.
Purchases: All purchases are made through the Administrative Council of Ecuadoran Railroads, Ministry of Public Works, Quito, Ecuador.

Name of Railway	Route Length (kilometers)
Bahia-Chone	79
El Oro	101
Guayaquil and Quito	452
Guayaquil and Salinas	152
Quito-Esmeraldas	202
Sibambe-Cuenca	70
Total	1,056

BAHIA-CHONE (Ferrocarril de Bahia a Chone) (Government) (Common Carrier) Address: Ferrocarriles Ecuatorianos, Calle Bolivar No. 17, Quito, Ecuador. Purchasing method: All purchases are made through the Administrative Council of Ecuadoran Railroads, Ministry of Public Works, Quito, Ecuador.

Length: Main line, 79 kilometers. Gage: 0.75 meters. Maximum curvature: 29 degrees. Maximum gradient: 3 percent. Rails: A.S.C.E. 35, 45, and 60 pounds per yard. Cross ties: Native untreated hardwoods 6" x 8" x 5' spaced 28 inches from center to center on straight track and 24 inches on curves. Bridges: 10 steel E-40 ranging from 5 to 50 meters in length. Tunnels: None. Fuel: Wood is used for fuel and is secured in abundant quantities along the route.

Repair shop: Located at Bahia with facilities limited to minor repairs and to the assembly of locomotives, passenger cars and freight cars. Employees: (1944) 196, nearly 100 percent Ecuadoran.

Equipment: (1944) Steam locomotives, 3 (1 Baldwin 31-ton "Mogul" type, 1 Baldwin 15-ton "Mogul" type, and 1 German 18-ton "Mogul" type); passenger cars, 2 (French, 30 passengers each); motor rail cars, 5 (Ford, 85 hp.); freight cars, 3 (capacity, 75,000 pounds); gondolas, 3 (capacity, 60,000 pounds).

Operating data: Operating data for the first ten months of 1944 are as follows: Total freight carried, 8,035.33 tons; freight ton—kilometers, 430,827; mixed train—kilometers, 17,829; average freight rate per ton—kilometer, .41 sucres; passengers carried, 91,062; passenger—kilometers, 2,707,562; autocarril —kilometers, 203,437; average fare per passenger—kilometer, .10 sucres; operating revenue, 514,952.57 sucres; other revenue, 153,049.02 sucres; operating expenses, 628,477.82 sucres; other expenses, 43,577.10 sucres; operating deficit, 4,053.33 sucres.

Classification of Freight

The revenue freight consists chiefly of agricultural products which include cotton, tagua nuts, coffee, cacao, and rice.

Territory Served

This railroad operates between the small Pacific coast port of Bahia de Caraquez and Chone, a village a short distance in the interior. The altitude of the line ranges from 3 to 22 meters. The climate is tropical with the wet season extending from January to May.

Importance of Line

This line serves as the only railway outlet for the agricultural produce in the central section of Manabi Province.

Unusual Features

The Bahia-Chone railway has no branches or rail connections with any other railway. During the rainy season the autocarriles handle almost all of the traffic since the roadbed becomes so soggy that it is incapable of supporting the weight of the locomotives.

Digitized by Google

Construction

This small isolated railway is a part of an original project which intended to link Bahia with Quito and provide the capital city with a more direct Pacific outlet, and to open up a considerable portion of the broad lowland coastal region of western Ecuador. Construction on this project ceased in 1913. No construction is proposed at the present time.

EL ORO (Ferrocarriles de El Oro) (Government) (Common Carrier) Address: Ferrocarriles Ecuatorianos, Calle Bolivar No. 17, Quito, Ecuador. Purchasing method: All purchases are made through the Administrative Council of Ecuadoran Railroads, Ministry of Public Works, Quito, Ecuador.

Length: Main line, 101 kilometers. Gage: Eastern Branch (Ramal Oriental), 1.067 meters; Southern Branch (Ramal Austral), 0.75 meters. Maximum curvature: 28 degrees. Maximum gradient: 2½ percent. Rails: A.S.C.E. 30 and 45 pounds per yard in 30-foot sections. Cross ties: Native untreated wood, 6″ x 8″ x 5′. Bridges: 10, E-40 steel, all located on the southern branch, ranging in length from 10 to 60 meters. Tunnels: None. Fuel: Wood is used for fuel and is secured in abundant quantities along the route. Clearance: No specific limits. Type of signaling: None used. Traffic is controlled through telephone and telegraph system.

Repair shops: Located at Machala with facilities for light repairs to equipment of both gages. Employees: (1944) 259, nearly 100 percent Ecuadoran.

Equipment: (1944) Steam locomotives, 6 (3 American and 3 German manufactured); motor rail, 7 (built in Ecuador with Ford motor, 85 hp., 30 passenger); box cars, 11 (capacity, 330,000 pounds); flat cars, 11 (capacity, 220,000 pounds); passenger cars, 2 (capacity, 30 passengers each).

Operating data: Operating data for the first ten months of 1944 are as follows: Total freight carried, 18,582.29 tons; freight ton—kilometers, 1,093,233; freight train—kilometers, 53,095; average freight rate per ton—kilometer, .45 sucres; passengers carried, 151,685; passenger—kilometers, 3,312,565; autocarril kilometers, 152,945; average passenger fare per passenger—kilometer, .12 sucres; operating revenue, 1,016,085.30 sucres; other revenue, 193,699.69 sucres; operating expenses, 1,016,085.30 sucres; other expenses, 309,152.31; operating deficit, 115,452.62 sucres.

Classification of Freight

The revenue freight of the Eastern Branch is composed chiefly of agricultural products, such as cacao, coffee, bananas, and other tropical fruits; while that of the Southern Branch includes coffee, cacao, rice, tropical fruits, livestock, grains and forest products.

Territory Served

The Eastern Branch operates between the coastal port of Puerto Bolivar through Machala to Pasaje, an interior town in the agricultural region. The right of way traverses an almost flat coastal lowland area reaching a maximum elevation at Pasaje of only 27 meters. Floods, produced either by the western equinoctial tides or by the overflow of the rivers coming down from the mountains in the east, are frequent.

The Southern Branch follows the low coastal plain from Puerto Bolivar through Machala and Santa Rosa to Piedras, a small town in the foothills. The elevation ranges from 2 to 120 meters. The area served is tropical and floods are frequent during the rainy season.

Importance of Line

Irrespective of the uncertain service, antiquated equipment, and poor maintenance, both branches are vitally important to the small areas that they serve. Piedras, the eastern terminal of the Southern Branch, is also the starting point of the muleteers that operate over the trails which at present form the only connecting link between railway and highways leading out of the mining districts at Zaruma and Portovelo.

Unusual Features

Because of the difference in gage, each branch is operated as a separate unit, although the system is a consolidation of the two lines.

Both branches are located in the area occupied by the Peruvians in the latter half of 1941, and are reported to have suffered considerable damage during that period.

The Eastern Branch operates a daily mixed-train service each way putting on additional special trains during the harvesting seasons. The Southern Branch runs regular trains in each direction 4 times a week adding special trains to take care of seasonal demands.

Construction

Construction of the Eastern Branch was completed in 1903; no new track has been laid since nor is any proposed at the present time.

The Southern Branch is a part of an original project intended to link the gulf port of Puerto Bolivar with Loja to the southeast and with Cuenca and Azogues to the northeast. In 1928, the Ecuadoran Government took over the operation and construction of the line and no new track has been laid beyond its present terminal of Piedras. No construction is proposed at the present time.

GUAYAQUIL AND QUITO RAILWAY COMPANY (Government) (Common Carrier) Address: Ferrocarriles Ecuatorianos, Calle Bolivar No. 17, Quito, Ecuador. Purchasing method: All purchases are made through the Administrative Council of Ecuadoran Railroads, Ministry of Public Works, Quito, Ecuador.

Length: Main line, 452 kilometers. Gage: 1.067 meters. Maximum curvature: 29 degrees. Maximum gradient: 5½ percent; also, long stretches of 4 and 4½ percent. Rails: A.S.C.E. rails, 55 pounds per yard in 33-foot sections and 70 pounds per yard in 30-foot sections. Cross ties: Untreated native hardwood, 6″ x 8″ x 4′4″, spaced 24 inches on centers. Bridges: 72 steel, E-35, constructed on masonry or concrete abutments. Tunnels: 3, ranging in length from 21 to 80.5 meters. Clearance: 16½ feet from top of rail and 12 feet in width; freight loadings limited to a maximum of 8 feet in width, 8 feet in height, and 30 feet in length. Fuel: Oil is used for fuel and is secured partly from domestic oil fields and partly from imports from the United States. Signaling equipment: None is used. Traffic is controlled by telegraph and telephone system.

Repair shops: Located at Alfaro (Duran), Riobamba, and Bucay. Facilities are available for both major repairs and the assembly of locomotives and rolling stock. Employees: (1944) 3,502, nearly 100 percent Ecuadoran.

Equipment: (1944) Motive power: This railway has a total of 34 steam locomotives, 23 of which are in operation and 11 not in operation. An analysis of this equipment shows that 32 percent were purchased in the last 10 years; 21 percent in the last 20 years; 9 percent in the last 30 years; 21 percent in last 40 years; and 17 percent were over 40 years old. This list includes 7 Baldwin 45-ton "Mogul" type, 24 Baldwin 70-ton "Consolidation" type, and 3 British 95-ton "Beyer-Garratt" type. Only 11 of these, all Baldwin "Consolidation 2-8-0" type, are less than 10 years old. Besides the steam locomotives, 1 Diesel, American 95-ton, purchased in 1944.

Rolling stock: Motor rail cars (gasoline operated) 7 in operation, 8 not in operation (capacity, 28 passengers); passenger cars, 30 in operation, 4 not in operation (capacity, 36 to 52 passengers); baggage cars, 7; box cars, 230 in operation, 19 not in operation (capacity, 20 tons); flat cars, 16 in operation, 2 not in operation (capacity, 20 tons); gondolas, 10 in operation, 3 not in operation (capacity, 20 tons); tank cars, 25 in operation, 1 not in operation (capacity, 5,000 to 6,000 gallons); work cars, 2.

Additional equipment: automobiles, 2 (5 passengers); steel launches (ferry boats) 8, (capacity, 100 tons each); tug boats, 2; motor ship, 1 (capacity, 160 tons).

Operating data: Operating data for the first eleven months of 1944 are as follows: Total freight carried, 375,338 tons; freight ton—kilometers, 82,423,938; freight train—kilometers, 638,649; mixed train—kilometers, 377,629; average freight rate per ton—kilometer, .26 sucres; passengers carried, 1,621,062; passenger—kilometers, 122,475,689; passenger train—kilometers (autoferros), 638,649; average passenger fare per passenger—kilometer, .07 sucres; operating revenue, 27,952,736.29 sucres; other revenue, 242,451.00 sucres; operating expenses, 22,149,888.53 sucres; other ex-

Digitized by Google

penses, 512,685.94 sucres; operating profit, 5,532,612.82 sucres.

Classification of Freight

Approximately 80 percent of the revenue traffic consists of freight. The volume of revenue freight is made up largely of agricultural, mineral, animal, forest, and manufactured products.

Territory Served

The Guayaquil and Quito Railway is the backbone connection between the two most important cities in Ecuador—Guayaquil, the country's chief seaport, and Quito, the capital of the Republic. This line also makes connections with the Siambe-Cuenca Railway in the South and the Quito-Esmeraldas Railway in the North, and by truck and water transfer with the Guayaquil and Salinas Railway.

The terrain traversed varies from sea level to the snow-covered volcanic peaks of the Andes; the climate varies accordingly from the hot tropical in the lowlands to the cold temperatures of the Andean ridges. The rainy season is from December to May. These variant climatic factors contribute to the high operating and maintenance costs of the line.

Unusual Features

The Guayaquil and Quito Railway traffic is subject to serious and costly interruptions during the rainy season. Floods, washouts, and landslides occur in the mountain and coastal sections of the line.

Because of the steep climb over the mountain section, involving a net change in elevation of 9,651 feet over a route track distance of only 78.5 kilometers, the effective tractive power of the locomotives is drastically curtailed and the trains are composed of only 5 or 6 units of rolling stock. The "Consolidation" type of engine now in use normally has a tractive effort of 32,150 pounds and could haul 2,143 tons over a dry level track. These locomotives hauling freight over the coastal division at an average speed of 29 kilometers an hour have a hauling capacity of 811 tons. On the mountain division, where the ruling grade is 5½ percent and the scheduled speed is 21 kilometers per hour, the hauling capacity is reduced to 139 tons. On the Sierra and northern sections these units are capable of hauling 215 tons at 24 kilometers an hour.

Ecuadoran Street Railways

Name of Street Railway	Route Length—Main Line (kilometers)	Gage (meters)
Compania Nacional de Tranvias	6.6	1.07
Tranvias de Guayaquil	14.7	1.44

COMPANIA NACIONAL DE TRANVIAS (Quito, Ecuador) (Street Railway). Ownership: 14,548 shares of the 18,000 shares (par value S/100 per share) are owned by the Cerveceria Nacional de Guayaquil (almost all of the balance of 3,452 shares are Ecuadoran-owned). The Cerveceria Nacional is in turn owned by the Ecuadoran Corporation, Ltd., which is an American Corporation. Address: Sucre 26, Quito, Ecuador.

Length: Main line, 6.6 kilometers, composed of 5.9 kilometers of single track and .7 kilometers of double track which goes through the business district. This company also owns 2.8 kilometers of abandoned track which it is seeking to take up but municipal authorities refuse to permit such action. Gage: 3'6". Rails: 40, 55, or 80 pounds per yard in 30- and 33-foot sections. Cross ties: Guayacan or eucalyptus wood, 8" x 5" x 6'. Ballast: Crushed rock. Switches: 6 in operation. Electrified track: Total mileage, 6.6 kilometers; voltage, 600 DC; contact, overhead. Electricity is obtained from La Electrica de Quito, an affiliated company. There has been no construction of tracks since 1940 and there is none proposed at this time.

Route: This consists of a single line operated from the north to the south end of the city.

Repair shops: Located at north end of the city and has power driven equipment consisting of: 2 lathes (1 for wheels and 1 for other purposes), 1 electric welding machine, 1 electric drill, 1 electric metal planing machine, 1 wood planer, and 1 saw. Employees: (1944) 55 (15 conductors, 15 motormen, 13 shop employees, and 12 office employees).

Operating data: Passengers carried (1944), 2,246,471; passenger fare, S/0.15, but the company has pending before the municipality an application for an increase to S/0.20.

TRANVIAS DE GUAYAQUIL (two lines are operated, known as Eloy Alfaro and American Park) (Street Railway). Ownership: Private. The company has a fifty-year contract with the municipality of Guayaquil beginning in 1910 and ending in 1960. The original contract contained a clause whereby the company paid two percent of the gross receipts to the municipality and at the termination of the contract all the rolling stock and equipment would be kept by the municipality. However, the contract was later amended and for the last twenty years the company has been paying the municipality 4 percent of the gross receipts and upon the termination of the contract the rolling stock and all equipment will be retained by the owner of the line. Nationality: Ecuadoran. Address: Sr. Rodolfo Baquerizo Moreno, Guayaquil, Ecuador.

Length: (1944) Main line, 14.7 kilometers. Gage: 4'8½". Gradient: There are no grades. Rails: 50 to 60 pounds per yard in 64-foot sections. Cross ties: Rough hewn Guayacan wood, 7" x 6" x 7', spaced 18 inches on centers. Ballast: Crushed rock. Switches: 2 automatic rail switches and 9 hand operated switches. Electrified track: Voltage, 500 DC; contact, overhead. Power is purchased from the Empresa Electrica del Ecuador. There has been no construction of tracks since 1940 and there is none proposed at this time. Only one car has a full set of windows. The cars are operated 17 hours a day.

Repair shops: 1 repair shop, employing 9 men, which is equipped to completely recondition 5 cars per year. The only power driven equipment is one small hydraulic jack and one portable electric welder. Employees: (1944) 90 (30 of them are conductors and their pay is 16 sucres per day ($1.16)). Capitalization: 450,000 sucres ($32,680) (bank selling rate of 13.77 sucres to $1.00) and the value of the business is estimated at 2,700,000 sucres ($196,078).

Operating data: Passengers carried (1944), 10,000,000; passenger fare, S/0.15.

Railways No Longer in Operation

Ambato—Curaray (Ferrocarril de Ambato a Pelileo)—Abandoned in 1936.

Manta—Santa Ana (Central Railway of Ecuador, Ltd.)—Completely discontinued its services in 1945.

Industrial Railways

The Ecuadoran industrial railways operate almost exclusively to serve the sugar mills and their respective plantations. Some of these lines are located entirely within the plantations and are used exclusively for the movement of the individual company's own products; two of the lines connect with the Guayaquil and Quito Railway. These sugar plantation lines operate during the sugar harvesting season and furnish transportation for certain classes of both passengers and freight.

The Anglo-Ecuadoran Oilfields, Ltd., is a short industrial railway line running from Ancon to La Libertad on the Santa Elena peninsula, a distance of 22.5 kilometers.

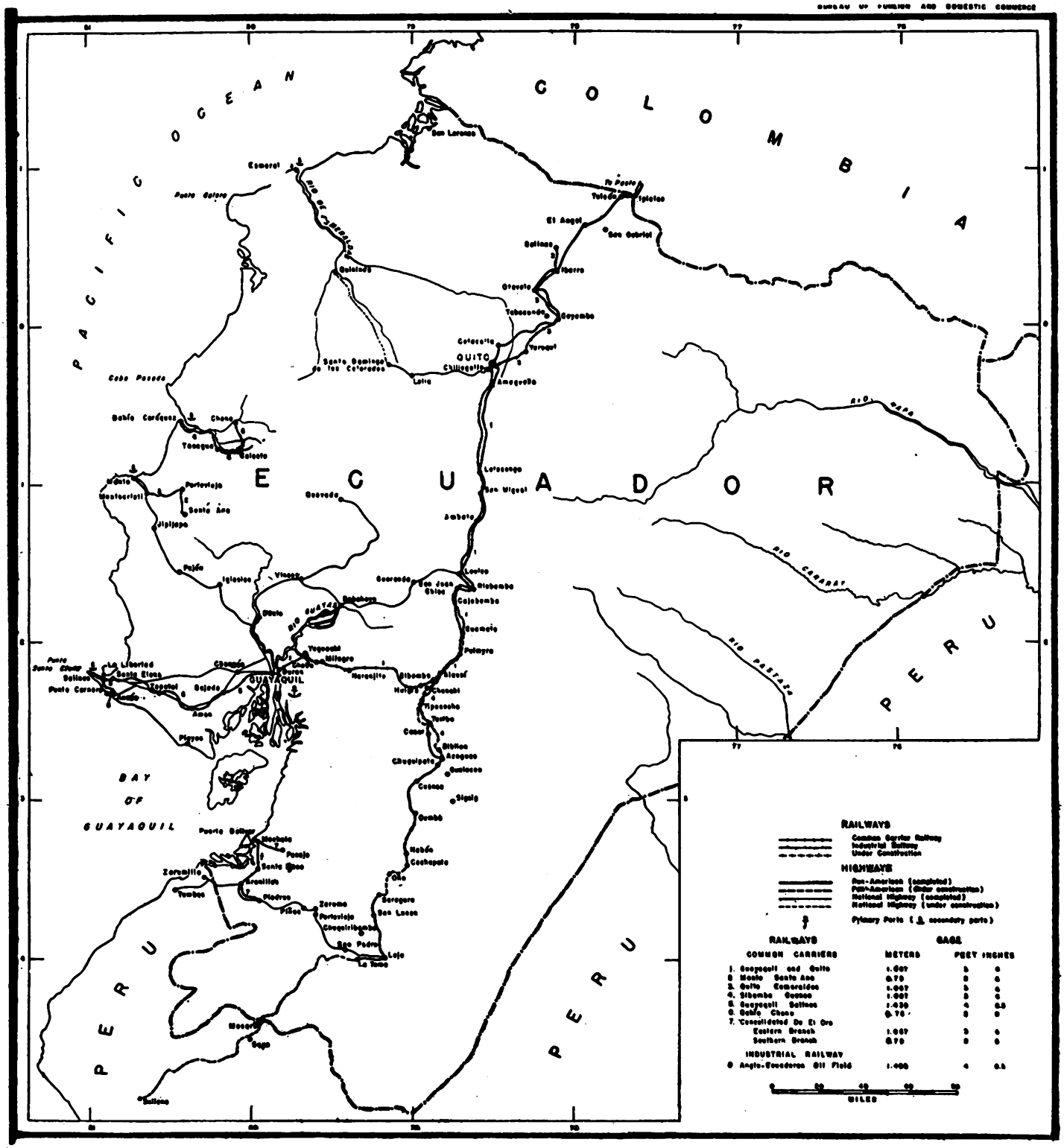
Although the data relative to the operation, equipment, volume of traffic, and capitalization are very meagre, the ownership, location, gage, and length of these various industrial lines are given below.

Ecuadoran Industrial Railways

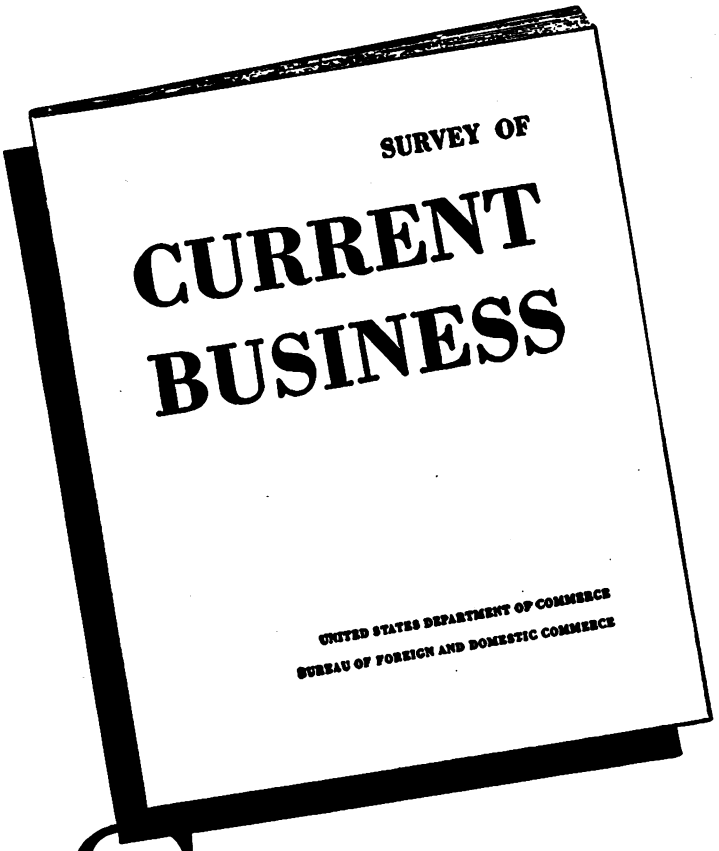
Name of Railway	Ownership	Location	Gage			Length
			Meters	*Ft.*	*In.*	*Kilometers*
F.C. del Ingenio "San Carlos" (sugar)	Ecuadoran	Mariduena, Yaguachi Canton	1.067	3	6	72.4
F.C. del Ingenio "Valdez" (sugar)	Ecuadoran	Milagro	0.914	3	0	41.8
F.C. del Ingenio "Luz Maria" (sugar)	Ecuadoran	Milagro	0.51	1	8	59.5
F.C. del Ingenio "Inez Maria" (sugar)	Ecuadoran	Garaycoa	Decouville			Not known
F.C. del Ingenio "Rocafuerte" (sugar)	Ecuadoran	Milagro	Not known			Not known
F.C. del Ingenio "San Pablo" (sugar)	Ecuadoran	Babahoyo	Not known			Not known
F.C. del Ingenio "Adelina Maria" (sugar)	Ecuadoran	Mariduena	Not known			Not known
Anglo-Ecuadorian Oilfields, Ltd.	Anglo-Ecuadorian Oilfields, Ltd.	Ancon-La Libertad	Decouville			22.5

★ U. S. GOVERNMENT PRINTING OFFICE: 1946—686654—259

Digitized by Google



Digitized by Google



$2.00
per year

SURVEY OF CURRENT BUSINESS

THIS AUTHORITATIVE MONTHLY PERIODICAL makes easily available to businessmen over 2,200 comprehensive facts about production, stocks, orders, prices, sales, shipments, etc., of the industries of the United States by means of text, tables, charts, and index numbers.

A sample copy will be sent, on request to the
Bureau of Foreign and Domestic Commerce,
Washington, D. C.

$2.00 per year, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Digitized by Google

Domestic Commerce

written for

BUSINESSMEN . .

● Here is an authoritative monthly periodical written in the language of the American businessman. It is one of the principal organs of the Department of Commerce for disseminating information deemed of importance in maintaining a vigorous and dynamic free enterprise system.

● Domestic Commerce gives the reader an understanding of the progress and changing conditions of industry and business of the United States. Its writers are officials of this and other Government agencies, and specialists in the various subjects covered.

● Particular attention is given to developments in the field of post-war planning.

[*A sample copy will be sent you upon request to the Bureau of Foreign and Domestic Commerce, Washington 25, D. C.*]

$1.00 per year . . . from the Superintendent of Documents

U. S. GOVERNMENT PRINTING OFFICE • WASHINGTON 25, D. C.

Digitized by Google

Documents Room

Industrial Reference Service

U. S. DEPARTMENT OF COMMERCE, HENRY A. WALLACE, *Secretary*
Office of International Trade, ARTHUR PAUL, *Director*

Part 1. TRANSPORTATION and PUBLIC UTILITIES

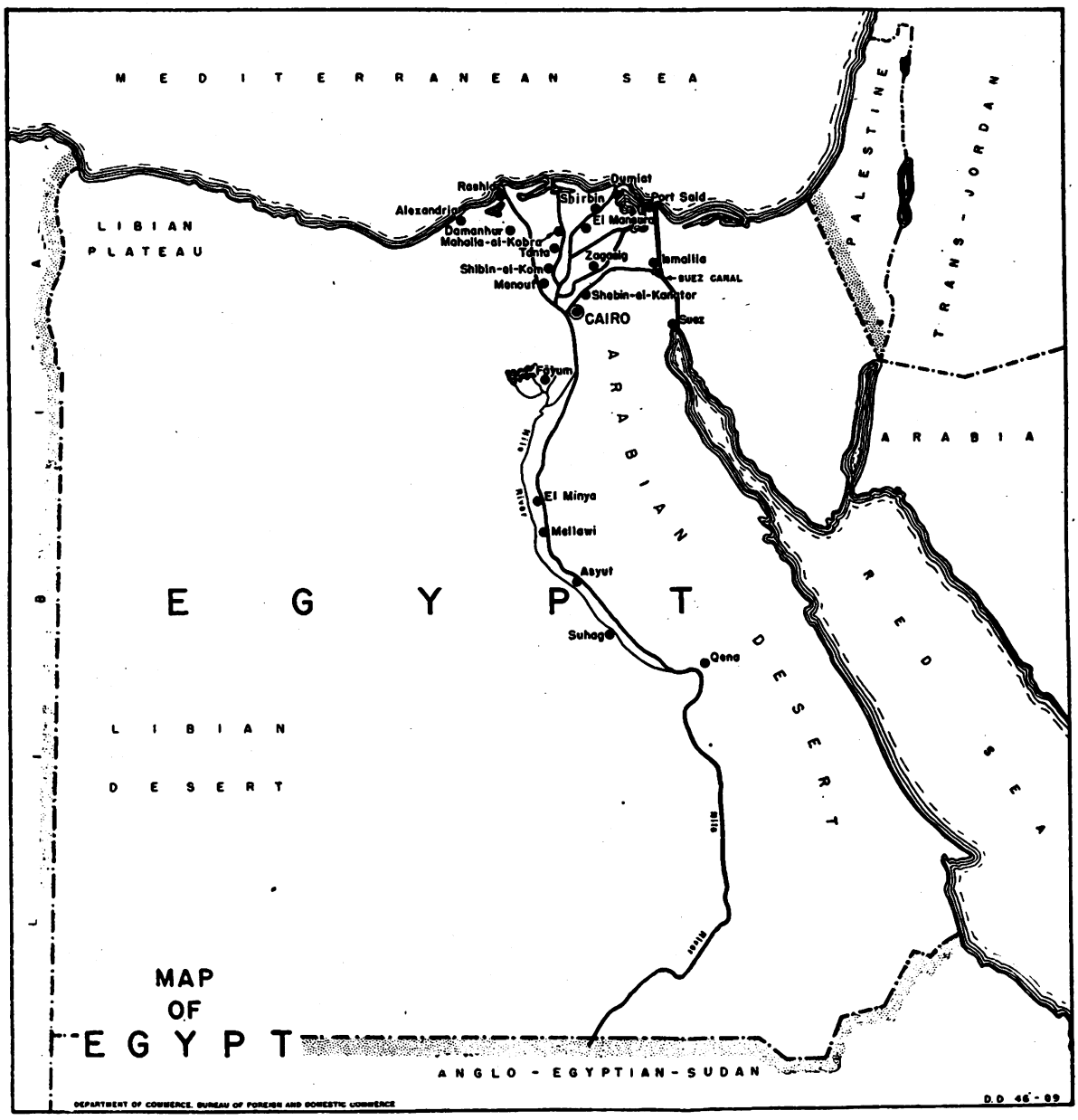
INDIANA UNIVERSITY
JUL 11 1946
14361
LIBRARY

Available in Parts Covering Selected Services and Commodities
Annual Subscription $1.50. Price this report 5 cents
For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., or any of the Department's Field Offices

Volume 4—Part 1 | June 1946 | Number 10

Egypt's Electric Power Supply

Prepared in the Transportation and Communications Division, Special Services and Intelligence Branch, Office of World Trade Promotion



Digitized by Google

Egypt's Electric Power Supply

Arranged for publication by Guida Berrigan Hall, Transportation and Communications Division

Digested from a report by Arthur E. Beach, American Legation, Cairo

Egypt has formulated plans for extending the country's electric power supply, which is now limited to the cities of Cairo and Alexandria, and to some of the principal towns of Upper and Lower Egypt. Postwar industrialization and transportation expansion are expected to greatly increase the country's demands for electric energy, inasmuch as only a small part of the power supply now available is utilized.

In the past 8 years the amount of electric power consumed in Egypt increased by about 60 percent. Consumption of power which totaled 287,000,000 kilowatt-hours in 1936 reached a peak of 473,000,000 kilowatt-hours in 1944.

In the past electric power has not played a conspicuous part in the economy of Egypt, except in connection with the electrification of the main pumping stations and in a few industries, such as textile, paper, cement, and sugar. The possibilities of more economical power from the development of the country's hydroelectric sources may well prove to be a major factor in improving the national economy of Egypt.

Today thermal plants (steam and diesel-operated) supply most of the electric power in Egypt; but hydroelectric plants operating from dams forming parts of the Nile River's irrigation systems will be erected, according to present governmental plans. The only hydroelectric generating stations now in operation are the Gharak (on Fayoum Falls) and the Nag Hammadi (barrage). The country has only two high tension lines and these are used to supply the pumping stations for irrigation purposes. There is no transmission net covering any part of Egypt.

Most of the equipment in use in the power plants is of European manufacture, with Swiss, Belgian, French and British makes predominating. During the war years, practically all such equipment imported by Egypt came from the United Kingdom.

Coal and oil, the former imported, supply the fuels for the operation of the thermal stations. Some of the private and official stationary installations when used for industrial or agricultural purposes employ diesel or steam direct-drive prime movers.

Generating Stations

Government-Owned Plants

Seventeen of Egypt's power plants are Government-owned. The total installed capacity of these plants approximates 48,120 kilowatts, with a peak load averaging 25,050 kilowatts. About 20 percent of the electric energy produced in Egypt is generated in these stations, a list of which will be found in table 1.

Twelve of the Government-owned plants, having a total installed capacity of 16,210 kilowatts, are operated by diesel prime movers.

The two hydroelectric plants previously mentioned are included in this Government-owned group, and have a total installed capacity of 5,360 kilowatts.

A steam turbine with a generating capacity of 5,000 kilowatts is used in the power plant of the Egyptian State Railway Station at Gabbari. The two remaining Government-owned plants employ steam turbines and diesels as prime movers, and have a total installed capacity of 21,550 kilowatts.

TABLE 1.—*Government-Owned Power Plants—Egypt*

Name of Plant and Location	Prime Movers	Current Generated [1]				Total Power Installed in Kilowatts
		Voltage	Phase	Cycles	A.C. or D.C.	
Gabbari, E.S.R.	Steam turbines	6,600	3	50	A.C.	5,000
Shatbi [2], R.E.R.	Diesel	550			D.C.	2,100
Atf, N.D.E.S.	Steam turbines	3,000	3	50	A.C.	15,300
	Diesel	200	3	50	A.C.	
Belquaz, N.D.E.S.	Diesel	3,000	3	50	A.C.	5,220
Seru, N.D.E.S.	Diesel	11,000	3	50	A.C.	1,960
Abu-el-Mensga (Shubra Ir.)	Diesel	11,000	3	50	A.C.	1,520
Abu-Zaabal (E.S.R.)	Diesel	3,300	3	50	A.C.	2,000
GizaGezira (Waterworks)	Diesel	500	3	50	A.C.	620
		110			D.C.	
Government Workshops, Cairo	Diesel	110			D.C.	270
Printing Press, Cairo	Diesel	110			D.C.	300
Survey Department	Diesel	110			D.C.	140
Tura Prison	Diesel	525	3	50	A.C.	600
		230			D.C.	630
Helwan	Diesel	3,300	3	50	A.C.	
Kafr-el-Elow (Helwan)	Diesel	3,300	3	50	A.C.	780
		230			D.C.	
Gharak (Fayoum)	Hydro	3,000	3	50	A.C.	2,660
Nag Hammadi	Hydro	3,000	3	50	A.C.	2,700
Edfu	Steam	3,000	3	50	A.C.	
	Diesel	200	3	50	A.C.	6,250

[1] See text for data on consumer current characteristics.
[2] Standby for Gabbari.

Municipally Owned Plants

The municipalities of Lower Egypt and Upper Egypt own 38 power-generating stations, of which 36 are powered by diesels, one by a water-turbine, and one by a gas engine. The total installed capacity of the municipal plants approximates 26,030 kilowatts with an average peak load of 11,091 kilowatts. Approximately 32,928,000 kilowatt-hours of electric energy are produced by these plants annually, or about 7 percent of the total energy generated in the country.

Among the larger of the municipal stations is the plant at Damietta (3,000,000 kw.-hr. annual production); Tanta (2,995,000 kw.-hr.); Port Said (2,750,000 kw.-hr.); and Suez (2,130,000 kw.-hr.).

Detailed statistical information concerning the municipally owned power plants in Upper and Lower Egypt is contained in tables 2 and 3.

Privately Owned Plants

Egypt's privately owned power plants furnish the majority of the country's electric energy, and included in this group are the plants servicing the cities of Cairo and Alexandria. These privately owned stations have a total installed capacity of 175,095 kilowatts and a peak load of 64,762 kilowatts. Their average annual production approximates 345,137,000 kilowatt-hours, or about 73 percent of all of the electric power generated in Egypt annually. Steam turbines operate about 85 percent of this group of power plants, and diesel-operated prime movers are found in about 15 percent.

The City of Cairo and suburbs consumes 48 percent of the power generated by the privately owned power plants, or approximately 35 percent of the country's total electric production, for lighting and industrial purposes. The principal power companies operating in the Cairo area are Lebon and Company (annual production 75,473,000 kw.-hr.), the Société Egyptienne d' Electricité (annual production 55,708,000 kw.-hr.), and the Comptoir des Ciments (annual production 31,000,000 kw.-hr.).

About 17 percent of all the electric power developed in Egypt, or about 24 percent of the power produced by the privately owned plants, is consumed in Alexandria and the nearby area for lighting and industrial purposes. The three principal producers of electric

Digitized by Google

TABLE 2.—*Municipally Owned Power Plants in Upper Egypt*

Name of Plant and Location	Prime Movers	Current Characteristics				Total Power Installed in Kilowatts
		Voltage	Phase	Cycles	A.C. or D.C.	
Fayoum	Hydro	3,000	3	50	A.C	1,180
Beni-Souef	Diesel	440			D.C	760
Fashn	Diesel	6,000	3	50	A.C	660
Maghagha	Diesel	3,000	3	50	A.C	220
Beni-Mazar	Diesel	440			D.C	320
Samallout	Diesel	6,000	3	50	A.C	360
Minieh	Diesel	3,000	3	50	A.C	700
Mallawi	Diesel	3,000	3	50	A.C	355
Dairout	Diesel	6,000	3	50	A.C	455
Menfalout	Diesel	3,000	3	50	A.C	235
Assiout	Diesel	3,000	3	50	A.C	1,540
Abu-tig	Diesel	6,000	3	50	A.C	515
Tahta	Diesel	6,000	3	50	A.C	505
Sohag	Diesel	6,000	3	50	A.C	705
Guirga	Diesel	6,000	3	50	A.C	495
Kena	Diesel	3,000	3	50	A.C	540
Luxor	Diesel	3,000	3	50	A.C	540
Aswan	Diesel	3,000	3	50	A.C	600

TABLE 3.—*Municipally Owned Power Plants in Lower Egypt*

Name of Plant and Location	Prime Movers	Current Characteristics				Total Power Installed in Kilowatts
		Voltage	Phase	Cycles	A.C. or D.C.	
Damietta	Diesel	3,000	3	50	A.C	1,100
Samanoud	Diesel	3,000	3	50	A.C	245
Simbellawein	Diesel	3,000	3	50	A.C	210
Mit Gamr	Diesel	3,000	3	50	A.C	465
Facous	Diesel	3,000	3	50	A.C	250
Zagazig	Diesel	3,000	3	50	A.C	1,170
Minia el Kamh	Diesel	440			D.C	130
Benha	Diesel	440			D.C	315
Belbeis	Gas	440			D.C	100
Kaha	Diesel	6,000	3	50	A.C	1,270
Suez	Diesel	220/3300	3	50	A.C	1,500
Port Said	Diesel	2,000	3	40	A.C	2,100
Dessouk	Diesel	6,000	3	50	A.C	545
Kafr el Sheikh	Diesel	3,000	3	50	A.C	245
Kafr el Zayat	Diesel	440			D.C	400
Mahalla el Kobra	Diesel	3,000	3	50	A.C	520
Tanta	Diesel	6,000	3	50	A.C	2,745
Shebin el Kom	Diesel	440			D.C	510
Menouf	Diesel	3,000	3	50	A.C	495
Damanhour	Diesel	3,000	3	50	A.C	1,030

TABLE 4.—*Privately Owned Power Plants—Egypt*

Name of Plant and Location	Prime Movers	Current Characteristics				Total Power installed in Kilowatts
		Voltage	Phase	Cycles	A.C. or D.C.	
Lebon & Co., Cairo	Steam, Diesel	10,000	3	40	A.C	39,600
Societe Egyptienne d'Electricite, Shubra, Cairo	Steam	10,000	3	50	A.C	31,500
Heliopolis Oases Co., Shubra, Cairo	Steam	10,000	3	50	A.C	1,800
Tramways Co., Boulac, Cairo	Steam	600			D.C	3,700
Electric Light & Power Supply, Emad-el-Dine, Cairo	Diesel	110			D.C	1,410
Egyptian Delta Land, Maadi, Cairo	Diesel				A.C	850
Ciment Tura	Steam, Diesel	3,000 & 500	3	50	A.C	7,790
Ciment Helwan	Steam, Diesel	500	3	50	A.C	3,400
Electricity & Ice Co., Ismailia	Diesel	3,000	3	50	A.C	920
Ste. du Canal Maritime de Suez, Port Fouad.	Steam, Diesel	5,500	3	50	A.C	2,500
Lebon & Co., Alexandria	Steam	2,000—10,000	3	50	A.C	20,300
Alexandria Railway, Alexandria	Steam	6,000	3	50	A.C	7,400
	Diesel	600			D.C	2,100
	Diesel				D.C	9,500
Paper Factory, Tabia, Alexandria	Steam	10,000	3	50	A.C	1,800
Filature Nationale d'Egypte, Alexandria	Diesel, Steam	500	3	50	A.C	2,500
El-Beida Textile Factory	Steam	400	3	50	A.C	1,750
Kafr-el-dawar Textile Factory	Steam and Diesel.	6,300	3	50	A.C	9,200
Mehalla El-Kobra Textile factory	Diesel and Steam.	6,300	3	50	A.C	15,055
Ste. des Sucrifies & Rafinerie d'Egypt						
Hawamdia	Steam	220	3		A.C	3,400
Cheikh Fadl	Steam and Diesel.	125			D.C	640
A. Korkas	Steam and Diesel.	225			D.C	2,080
Nag Hammadi	Steam and Diesel.	125			D.C	2,200
Armant	Steam and Diesel.	125			D.C	2,200
Kom-Omba	Steam and Diesel.	220			D.C	1,100
Ste. Wa di Kom-Ombo					D.C	400

energy in this city are Lebon and Company (58,364,000 kw.-hr.), the Alexandria and Ramleh Railway Company (18,654,000 kw.-hr.), and the paper factory at Tabia, Alexandria (4,040,000 kw.-hr.).

Other privately owned and operated power plants in Egypt include the Electricity and Ice Company at Ismailia (2,540,000 kw.-hr.), the Suez Canal Company at Port Fouad (4,233,000 kw.-hr.), the El-Beida Textile Factory (5,400,000 kw.-hr.), the Kafr-el-Dawar Textile Factory (14,570,000 kw.-hr.), the Mahalla - El - Kubra Textile Factory (43,640,000 kw.-hr.), and Sugar Refinery Company of Egypt (23,061,000 kw.-hr.). Further information concerning Egypt's privately owned generating stations is given in table 4.

Transmission Lines

Underground cables predominate in the towns and municipalities, and overhead lines are used in the outlying areas for the transmission of electric energy from the power stations to the distributing centers. The voltage ranges from 3,000 to 30,000 volts. Practically all distribution lines in Cairo are underground, while in the near-by suburban towns of Maadi and Helwan, and in the Abbasiyah Barracks overhead distribution wires are used.

The only two high tension power lines in Egypt which, as previously mentioned, are for pumping purposes, transmit current at 30,000 volts, 3 phase, 50 cycles. One of these lines is in the Northern Delta section and supplies about 17 pumping stations through transformer stations. This line is over 186 miles (300 km.) long, and has two parallel circuits on steel lattice towers. The spans at the two crossings of the Nile River are each about 2,950 feet between 160-foot high towers. The clearance above water level is about 80 feet.

The second high tension line is a single circuit about 93 miles long. It receives its current from the Edfu power station and supplies 14 pumping stations for the cultivation of isolated basin lands in Aswan province. It has one double circuit crossing the Nile River at Edfu, similar to the Northern Delta crossings described above, from which one of the circuits runs north and the other south.

Current Characteristics of the Distribution Systems

Electricity supplied to Cairo by Lebon and Company, the largest producer of power in Egypt, is 3 phase, 40 cycles, alternating current, 10,000 volts, and 3 phase, 40 cycles, alternating current, 3,500 volts. Primary transmission is 10,000 volts, 3 phase, while secondary is supplied at 3,500 volts, 3 phase, and 2,000 volts, single phase.

Direct current of 110 volts is supplied to parts of the central section of Cairo by the Electric Light and Power Supply Company of that city.

With the variation in the electric supply of Cairo, an electric equipment

Digitized by Google

problem is presented to persons who find it necessary to move from one section of the city to another. Local distribution may be either alternating or direct current, 100 or 200 volts, 40 or 50 cycles, depending upon the section of the city to be served. In Heliopolis, a suburb of Cairo, the transmission circuit is 10,000 volts, 3 phase, 50 cycles, alternating current, and the distribution is made at 115/200 volts, 3 phase, alternating current, 4 wires.

In Alexandria, Lebon & Company has 3 phase cables running to three substations, one in the center of the city, and the other two at Ibrahimiyah and Bulkeley. At the former station the current is stepped down to 2,000 volts and at the latter two to 3,000 volts. Two-core cables from these stations supply single phase transformers, many of which are mounted on poles. Local distribution is 3 wire, 220 volts. Warehouses and factories which are located in the Mina-al Basal area receive power through a separate 2,000-volt cable to sub-stations in the area.

In municipalities of Upper and Lower Egypt, distribution to consumers is mostly at 200/220 volts, 3 phase, 50 cycles. This includes such towns as Damanhour, Damietta, Kafr el Zayat, Ismailia, Fayoum, Mahalla el Kubra, Minieh, Mit Gamr, Shebin el Kom, Suez, Tanta, Assiout, and Zagazig. In Luxor, electric current is distributed at 100 volts, 3 phase; Belbeis receives its power at 200 volts, direct current, and Port Said's current distribution is at 105/180 volts, 3 phase, 40 cycles. The electric current used by the Suez Canal Company is 3 phase, 110/190 volts; while the Shell Company (British) at Suez uses direct current supplied at 220 volts.

Consumption of Power

The total annual consumption of electricity in Egypt, according to recent Government information, has reached 473,600,000 kilowatt-hours, which is a considerable increase over the average annual prewar consumption of 287,700,000 kilowatt-hours. The following figures (table 5) shows the consumption of electricity in Egypt by types of consumers in 1936, the latest figures available:

TABLE 5.—*Electricity Consumed in Egypt, 1936*

Type of Consumer	Kilowatt-hours
Traction (street railways, etc.)	45,600,000
Irrigation and drainage (pumping stations, etc.)	42,000,000
Industry	120,100,000
Lighting	51,400,000
Losses in transmission and distribution	28,600,000
Total	287,700,000

The majority of the larger industrial establishments in Egypt produce all or part of their own power either by steam turbine or diesel installations. While present installations appear to be fairly adequate for the power demand, the expanded production envisaged for postwar Egypt would soon prove them to be greatly inadequate. The present annual utilization of electric energy by some of the larger industrial consumers is as follows:

	Kilowatt-hours
Cement companies	31,000,000
Textile mills	65,430,000
Paper mill	4,040,000
Sugar refineries	23,061,000
Transport systems:	
Egyptian State Railway workshops.	2,500,000*
Street Railway Systems of Cairo and Alexandria	60,000,000*
Suez Canal Company	4,233,000
Land Development companies	4,500,000

* Estimated, based on figures for earlier years.

The above power demands represent approximately 41 percent of the total electric energy produced in Egypt annually.

Additional power demands which are expected to develop in the postwar period include plans for a large nitrate fertilizer plant in Upper Egypt; partial electrification of the Egyptian State Railways; extension of the irrigation system through additional reservoirs and pumps; additional manufacturing enterprises; and development of rural electrification.

Regulation of Electric Utilities

Egypt is a party to the Geneva Convention of December 9, 1923 regarding the transmission of electric energy and hydraulic power, with adherence from January 16, 1939 and April 28, 1940, respectively.

The increase in Egyptian electric rates in recent years was necessitated by the advanced costs of the fuels required for the operation of the thermal generating stations. Definite figures are not at hand at this time. Information received in September 1945 shows that the electric power produced by Lebon and Company for use in lighting and general domestic purposes, cost approximately 9.4 cents per kilowatt-hour.

Electric rates prevailing in 1940, according to information supplied by the Egyptian Ministry of Public Works, were as follows: Government-produced power cost from 1.1 to 2.1 cents, municipally produced power from about 4.6 to 14.7 cents, company-produced power for lighting from about 5.1 to 10.8 cents, and company-produced power for day power from about 1.7 to 6.7 cents.

Postwar Electrification Plans

The Egyptian Government is making extensive postwar electrification plans based on potential hydroelectric power developments along the Nile River. These plans include the development of hydroelectric power at the present Aswan Dam, and at the various barrages on the Nile below Aswan, such as Eana, Nag Hammadi, Assiout, Delta Barrage, and Zifta. In connection with the production of electric power at these points, the government plans to install a high tension network of transmission lines in order that the power developed may be available to all sections of the country.

A committee of prominent Government officials commenced work on this project in June 1945, but it is expected that the realization of the contemplated project will require a number of years and a total eventual cost of L.E. 90,000,000. The work will be done gradually. Immediate plans include the electrification of the present Aswan Dam. At first it was thought that it would be necessary to erect two separate power plants at Aswan because of the variations in the fall of water between high and low flood, but it is now believed that the development of the Kaplan-type turbines, which are adaptable to variations in flow, will permit the development of power by means of a single generating plant.

The question of the necessity of again raising the height of the Aswan Dam has also been discussed in connection with the installation of electric generating equipment. It has now been decided that the construction of the dam will not stand a third heightening and that hydroelectric generating equipment shall be installed in the present dam, and if a higher dam is required for flood control and irrigation purposes, a new dam will be constructed and the hydroelectric installations currently planned for the present dam will be moved to it.

Other Governmental plans include the electrification of the various barrages scattered along the length of the Nile below Aswan and the tying-together of these developments with that at Aswan through an extensive transmission and booster system, which will supply hydroelectric power to all parts of Egypt including Cairo and the Lower Delta area.

★ U. S. GOVERNMENT PRINTING OFFICE: 1946—688654—260

Digitized by Google

Documents Room

Industrial Reference Service

U. S. DEPARTMENT OF COMMERCE, HENRY A. WALLACE, *Secretary*
Bureau of Foreign and Domestic Commerce, AMOS E. TAYLOR, *Director*

Part 1. TRANSPORTATION and PUBLIC UTILITIES

Available in Parts Covering Selected Services and Commodities
Annual Subscription $1.50. Price this report 5 cents
For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., or any of the Department's Field Offices

Volume 4—Part 1 June 1946 Number 11

Highways of Ecuador

Prepared for Publication in the Transportation and Communications Division, Office of International Trade

INDIANA UNIVERSITY
JUL 24 1946
LIBRARY



Digitized by Google

Highways of Ecuador

Prepared by Edgel C. Skinner

Based on Reports by Foreign Service Officers, United States Embassy, Quito and Other Official Reports

Outlook

The national highway system of Ecuador at present is not well developed. Thus modern highway transportation does not play as important a role in the economic life of the people as do such ancient transportation media as the pack mule, canoe, and balsa raft—used in short hauls between farm and village—or the railway, which connects the coast with the sierra and the south central sierra with the north sierra.

On the other hand, the full economic development of Ecuador is in no small measure dependent on the construction of roads to make accessible for exploitation a great portion of the country's land area. It has been estimated that about 87 percent of the country's area is unexploited. A great part of it could be cultivated if the land were cleared, improved, and made accessible by road construction.

A growing interest is being shown by the Government in highway development and in the last several years appropriations for public works has represented a substantial portion of the total of each year's budget—about 16 percent in 1943 and 1944. In 1945 these appropriations represented an even greater part of the total budget—27 percent. Of the funds appropriated for public works each year, the major portion has been allocated for highway purposes.

The Pan American Highway, running through the high plateau which separates the Eastern and Western Cordilleras of the Andes in Ecuador, is the backbone of the road system. With the completion of the Guamote-Tambo section, for which a contract was recently awarded, and part of an Export-Import Bank loan allocated, the Ecuadoran section of the highway will be an all-weather road between the Colombian frontier and Loja, in the south.

The present emphasis, however, is on the construction of roads leading from the Pan American Highway to the coast and roads connecting Guayaquil, the chief port and commercial center, with other coastal towns. In the 1945 budgets, a total of 32,000,000 sucres was allocated for road construction. This allocation was specifically apportioned for construction on roads leading from the Pan American Highway and a road connecting Guayaquil and Manta, as follows:

Road	Sucres [1]
Quito-Esmeraldas	9,000,000
Latacunga-Manta	8,000,000
Tambo (Baquerigo Moreno)-Alfaro (Duran)	5,000,000
Ambato-Guaranda-Guayaquil	5,000,000
Guayaquil-Manta	5,000,000
Total	32,000,000

[1] Effective selling exchange rate in 1945 was 13.77 sucres to the dollar.

General Information

The area of the Republic of Ecuador (estimated to be 104,000 square miles if the Galapagos Islands are included) is approximately equal to either the combined areas of the States of New York, New Jersey, and Pennsylvania or the area of the State of Colorado. However, its population of 3,089,000 (estimated in 1942) is about one-ninth the combined populations of the three industrial States but more than two and a half times that of the western State. Ecuador will be able to support a larger population and increase its present low per capita income when it can exploit more fully its potential wealth.

The retarded economic exploitation of the country is in no small measure attributable to the fact that the Eastern and Western Cordilleras of the Andean mountain system run the length of the country. These mountain ranges, rising abruptly in this part of South America from the sea level regions on either side, divide Ecuador into three unlike topographical, social and economic regions:

1. The low coastal plain, where the tropical agricultural products, which are the chief source of Ecuador's national income, are produced, for the most part under a plantation economy.
2. The sierra, where about 60 percent of the population live (chiefly by means of subsistence agriculture), although this region covers only about 26 percent of Ecuador's area.
3. The little explored oriente, isolated by the Eastern Cordillera's steep eastern slopes, over which road building presents difficult engineering problems.

Except for a railroad and a dry-season road, there are no modern surface transportation routes between the coastal and sierra region, and the region east of the Andes for the most part is isolated from the rest of the world. Construction of roads connecting the sierra and oriente was started only in recent years.

Highway Development

It is estimated that the highway system of Ecuador (including urban streets) totaled 4,350 miles at the end of 1944. On the basis of this estimated highway mileage, there was, in 1944, 1 mile of road per 23.9 square miles of territory.

Latest available statistics of rural highways of New York, New Jersey, and Pennsylvania (the combined areas of which approximate that of Ecuador as noted above) indicate that the rural highway systems of these States total about 192,125 miles while the highway system of Colorado (the area of which also approximates that of Ecuador) totals 75,460 miles. On the basis of these statistics of mileage, there was 1 mile of road per 0.5 and 13.8 square miles, respectively, of territory in the three eastern States and Colorado.

If comparative highway development among the 21 American republics is measured by ranking the area per mile of road, Ecuador was fourteenth.

Types of Road Construction

Unimproved earth roads accounted for about 62 percent of the country's total mileage (table 1) in 1944, and it is probable that from 600 to 900 miles of roads suitable only for pack mules were included in the estimated mileage of unimproved earth roads. An estimated 1,550 miles of unimproved earth roads were passable in dry season only.

TABLE 1.—*Ecuadoran Highway Mileage by Construction Type, 1944*

Construction type	Miles	Percent of total
Unimproved earth	[1] 2,734	62.8
Improved earth, sand, clay, gravel	1,056	24.3
Cobblestone	420	9.7
Paved surfaces	78	1.8
Block-stone, wood, asphalt, and brick	62	1.4
Total	4,350	100.0

[1] About 1,550 miles of the unimproved earth roads are usable only in the dry season.

About 25 percent of the total road mileage is improved earth, crushed rock, or gravel surface; 10 percent, cobblestone. Paved road mileage shown in table 1 includes paved streets in Quito and Guayaquil, the 18-mile asphalt Progreso-Playas road, and a few tar-surfaced macadam roads near Guayaquil and Ancon.

Highway Transport

There are no organized or incorporated highway transport systems. In 1942, it was reported that about 350 trucks were used in interurban services, the principal route being between

Digitized by Google

Riobamba and Quito. Trucks are operated by individuals or informal partnerships and are subject to no contracts, systems of operation, or trade-union agreements.

The only significant competition between any two means of transport in Ecuador is that between motor and rail transport over the route connecting Riobamba and Quito. To meet competition in passenger service, the Guayaquil and Quito Railway introduced bus service between Cajabamba and Quito in 1939.

Methods of Finance

Although taxes are levied on motor vehicles and gasoline, revenues from this source are included in the general revenues rather than set aside for highway purposes. Prior to 1945, the major portion of the funds for highways were derived from regular budget appropriations. Supplementing these appropriations were funds from the Extraordinary Budget which prior to 1945 derived its revenues from the Government's share of the income of the State monopolies and from revenues of post offices, telecommunications, and taxes on sugar, alcohol and mining properties.

In 1945, as may be noted in the discussion below of the 1945 appropriation to the Ministerio de Obras Publicas y Comunicaciones (Ministry of Public Works and Communications), the major portion of the funds for highways were appropriated from the Extraordinary Budget, which in that year derived the greater part of its revenues from a Central Bank loan. The Extraordinary Revenue Budget for 1945 was as follows:

Source of revenue	Sucres
Balance from special accounts	24,400,000
Central Bank loan	85,150,000
Total	109,550,000

In addition to budget appropriations the revenues from special production taxes on gold and copper mining companies are allocated almost entirely to specific highway projects. As these special revenues are distinct from budget accounts, they do not appear in any budget.

Table 2 shows the estimated expenditures of the Ministerio de Obras Publicas y Comunicaciones and Ministerio de Defensa Nacional (Ministry of National Defense) for roads in the period between January 1, 1939, and May 31, 1944, as well as special mining production tax revenues collected for specific highway projects. The Ministerio de Defensa Nacional has jurisdiction over road construction and maintenance in the oriente; the Ministerio de Obras Publicas y Comunicaciones, in the rest of the country.

In addition to the expenditures shown above, others were made after 1940 from Export-Import Bank credits for specific highway projects. Like the special revenue accounts for specific highways, the funds from the Export-Import loans are distinct from budget accounts and do not appear in any budget.

TABLE 2.—*Estimated Ecuadoran Road Expenditures from Various Government Accounts, 1939 to 1944*

[In sucres]

Year	Ministry of Public Works	Ministry of Defense	Special taxes
1939	8,168,762	3,000,000	4,378,711
1940	4,527,977	(1)	3,702,943
1941	6,672,019	(1)	4,358,554
1942	[2] 2,385,644	1,640,000	4,015,184
1943	4,925,303	2,232,799	4,142,556
1944	5,130,704	1,560,400	4,000,000
Total	31,810,409		24,597,948

[1] Amount of appropriation spent on roads not available.

[2] Although the fiscal year of the Government of Ecuador corresponds with the calendar year, the Ministry of Public Works, in 1942, changed its fiscal year, which formerly also corresponded with the calendar year, to a June 1 to May 31 period. Thus, expenditures of this ministry in 1942 are for 5 months only. All other amounts (Ministry of Defense and special taxes) shown were distributed on a calendar year basis.

In 1940, the President of Ecuador was authorized to contract for loans from the Export-Import Bank up to the amount of $30,000,000. Although to date loans from the bank are far under this sum, press reports indicate the possibility of a $20,000,000 loan from this source for the construction of public works.

1945 Public Works Appropriations

In the national budgets of 1945, the Government considerably increased the appropriations to the Ministerio de Obras Publicas y Comunicaciones. As may be noted in table 3, the appropriations to this Ministry in 1945 totaled 95,850,000 sucres ($7,316;718); which amount represented 27 percent of the total appropriations of all national budgets in 1945. The appropriations to the Ministerio de Obras Publicas y Comunicaciones increased 280 percent as compared with appropriations to this Ministry in 1943, while funds of all budgets increased 124 percent.

As also may be noted in table 3, the appropriations from the Extraordinary Budget of 1945 accounted for all of the increased appropriations to the Ministerio de Obras Publicas y Comunicaciones. The greater part (71,786,160 sucres or $5,479,860) of these appropriations from the Extraordinary Budget were allocated for road purposes.

Following are allocations for highway purposes to the Ministerio de Obras Publicas y Comunicaciones in 1945, totaling 68,702,160 sucres ($5,244,745). This amount represented 84 percent of the appropriations to the Ministerio de Obras Publicas y Comunicaciones from the Extraordinary Budget.

Item	Sucres
Salaries	531,360
Special construction and general maintenance	10,170,800
Highway construction	32,000,000
Highway equipment and tools—investment	26,000,000
Total	68,702,160

Note: These allocations do not include certain undisturbed administrative items.

In addition to appropriations assigned to the Ministerio de Obras Publicas y Comunicaciones for road purposes, appropriations of the Extraordinary Budget to the Ministerio de Economia (Ministry of Economy) allocated funds totaling 3,084,000 sucres ($235,420) for specific highways. Thus allocations for highways from the Extraordinary Budget of 1945, totaled 71,782,160 sucres ($5,480,165).

However, the portion of the Extraordinary Budget of 1945 disbursed in that year is not known. Since the greater part of the revenues of the Extraordinary Budget is derived from a dollar loan of 85,150,000 sucres ($6,500,000) from the Central Bank of Ecuador to be made available to the Government in the next 3 years, it is generally presumed that the 1945 Extraordinary Budget will be extended into 1946 and 1947. A portion of the loan amounting to 32,750,000 sucres ($2,500,000) was to have been made available to the Ministerio de Obras Publicas y Comunicaciones in 1945.

No report concerning allocations to the Ministerio de Obras Publicas y Comunicaciones for highway projects from the Ordinary Budget has been received.

Since a lump appropriation, without any specific allocation, is made to the Ministerio de Defensa Nacional, it cannot be determined whether its budget for highways in 1945 was greater than expenditures in previous years.

Principal Highways

The present plan of Ecuador's highway system projects one north-south trunk highway (Ecuador's section of the Pan American Highway), running through the Andean highlands, with branch roads leading either to the coastal lowlands or the oriente.

Table 4 shows the length and surface classification, by sections, and altitude at various points, of the Pan American Highway and the principal branch roads.

Pan American Highway

Ecuador's section of the Pan American Highway begins at Rumichaca, on the Colombian border, and extends via Quito and Loja to Las Chinchas, from where according to present plans it will extend via Macara to La Tina, on the Peruvian border. At the end of 1944, the Pan American Highway, 690 miles in length if routed according to plan, had two incomplete sections; The Guamote-Tambo and Las Chinchas-La

Digitized by Google

Tina, 86 and 80 miles, respectively, in length.

The section of the Pan American Highway north of Quito crosses rugged terrain, varying in altitude from 2,000 to 14,000 feet. Throughout this section of the highway, 167 miles in length, grades are steep.

From Rumichaca, about 9,186 feet in altitude, the road, which has a cobblestone surface in this stretch, runs a distance of 5 miles to Tulcan, 9,767 feet in altitude, before forming (about 3 miles beyond Tulcan) two branches: The Las Juntas-San Gabriel-San Alfonso road, about 59 miles in length, and the Las Juntas-El Angel-San Alfonso road, about 55 miles in length. The latter road is better for motor traffic as the one via San Gabriel is narrow and cars can pass only with difficulty.

The Las Juntas-El Angel-San Alfonso road crosses high rolling terrain, with little vegetation other tnan large cactus plants known as freilejon, to El Angel. At El Angel, the road begins a steep descent, about 20 miles in length, to the Chota River, which runs tnrough a desert valley.

From the river crossing at the village of Chota, where this northern section of the highway reaches its lowest altitude, the road climbs, with fairly gradual ascent, to a mountain pass. From this pass, the road descends to the high mountain valley, in which Ibarra—20 miles distant from Chota—lies at an altitude of 7,677 feet.

Between Ibarra and Cayambe, a distance of 40 miles, another pass is crossed. From Cayambe, 7,716 feet in altitude, the road continues for 23 miles to Guaillabamba, 6,909 feet in altitude. At Guaillabamba, the road begins a steep ascent—2,000 feet within a distance of 15 miles—before continuing for 10 miles to Quito, 9,350 feet in altitude.

The section of the Pan American Highway between Quito and Guamote runs through the most densely populated area of Ecuador. Villages and small towns are found at frequent intervals on the road.

Except for short stretches of all dirt or gravel, the surface of the road between Quito and Riobamba is cobblestone of about one-car width in the middle, with car width dirt-surfaced shoulders. Between Riobamba and Guamote, however, the road is of improved earth surface. As the section of the highway between Quito and Guamote runs through a high valley between the Eastern and Western Cordilleras, the altitude does not vary greatly.

As noted earlier, the section between Guamote and Tambo, about 80 miles in length as projected, is one of the two incomplete sections of the highway. Although some sections have

TABLE 3.—*Ecuadoran Ordinary and Extraordinary Budget Appropriations to the Ministry of Public Works, 1943 to 1945*

[In sucres]

Year	Ordinary budget	Extraordinary budget	Total	Percent of total annual National budgets
1943	14,500,015	10,703,000	25,203,015	15.6
1944	24,803,933	12,230,000	37,033,933	15.5
1945	14,000,000	85,150,000	95,850,000	27.0

TABLE 4.—*Principal Ecuadoran Highways*

Sections	Notes on road conditions	Approximate length of section (miles)	Approximate altitude at initial terminus (feet)
Pan American Highway			
Rumichaca-Ibarra	25 percent, cobblestone; 50 percent, gravel; 25 percent earth.	83	9,186
Ibarra-Quito	50 percent, cobblestone; 50 percent, earth and gravel.	84	7,677
Quito-Riobamba	Cobblestone	112	9,350
Riobamba-Guamote	Improved earth	26	9,180
Guamote-Tambo (Baquerizo Moreno)	Trail only. Short sections passable.	86	
Tambo-Cuenca	75 percent, cobblestone; 25 percent, earth and gravel.	47	9,760
Cuenca-Cumba	Earth and gravel.	12	8,468
Cumba-San Lucas	Packed rock.	106	8,871
San Lucas-Loja	Natural earth, with rock base	14	8,711
Loja-Las Chinchas	do	40	7,375
Las Chinchas-La Tina	Poor dirt road and trail	80	5,840
Total		690	
Roads leading from Pan American Highway to coast			
Quito-Esmeraldas:			
Quito-Santo Domingo	Impassable for short periods during rainy season.	80	9,350
Santo Domingo-Esmeraldas	Construction in progress.	119	
Quito-Bahia de Caraquez:			
Quito-Santo Domingo		80	9,350
Santo Domingo-Mile 22	Impassable for short periods.	22	
Mile 22-Bahia de Caraquez	Projected. Some studies made.	151	
Latacunga-Manta:			
Latacunga-Zumbahua	Poor	38	9,190
Zumbahua-Quevedo	One of best in country.	66	
Quevedo-Manta	Under construction at present	109	
Ambato-Guaranda-Guayaquil:			
Ambato-Guaranda	Projected.	60	8,556
Guaranda-Guayaquil	Dry-weather only.	168	8,753
Cuatro-Esquinas-Guayaquil	Dry-weather only.	205	
Tambo (Baquerizo Moreno)-Alfaro (Duran)	Under construction at present.	124	9,760
Estacion Cumbre-Puerto Bolivar:			
Estacion Cumbre-Giron	All weather road.	27	
Giron-Puerto Bolivar	Projected.	75	
San Pedro-Piedras	Impassable for short periods.	93	
San Pedro-Puerto Bolivar:			
San Pedro-Panupali	Impassable for short periods.	87[1]	
Panupali-Santa Rosa	About 9 miles under construction.	191[1]	
Santa Rosa-Puerto Bolivar	Projected.	401[1]	
Roads leading from Pan American Highway to oriente			
Tulcan-Santa Rosa:			
Tulcan-El Pun	In use, but in poor condition	27	9,767
El Pun-Quebrada	Road completed and in use	12	
Quebrada-Los Andesto	Horse trail	3	
Los Andesto-Santa Rosa	No construction or studies	94	
Quito-Napo:			
Quito-Pifo	In use, but in poor condition	22	9,350
Pifo-Guamani	Construction completed	16	8,583
Guamani-Baeza	Under construction and study	31	
Baeza-Napo	No studies	67	
Ambato-Canelos:			
Ambato-Banos	In use	27	8,856
Banos-Mera-Shell Mera	do	34	
Shell Mera-Puyo	Under construction	7	
Puyo-Canelos	Projected	25	
Cuenca-Macas:			
Cuenca-Paute	In use	25	8,468
Paute-Mile 22	do	22	
Mile 22-Mile 34	Studies made	12	
Mile 34-Macas	No studies	59	
Other roads			
Ancon-Salinas	Asphalt to La Libertad	22	
Progreso-Playas	Asphalt	18	
Guayaquil-Manta	Asphalt between Manta and Montecristi; rest, dry-weather only	135	
Guayaquil-Salinas	Dry-weather only	90	

[1] Estimated.

Digitized by Google

been constructed between Guamote and Alausi, continuous passage by motor even in this stretch is impossible.

Recently, however, a contract was signed with an American company for the construction of this road between Guamote and Tambo. Part of the $1,980,000 cost will be paid from a portion of a $1,200,000 loan by the Export-Import Bank of the United States; the remainder, from appropriations by the Ecuadoran Government.

From Guamote, the road is to follow roughly the line of the Guayaquil and Quito Railway to Sibambe; from Sibambe, the line of the Sibambe-Cuenca Railway.

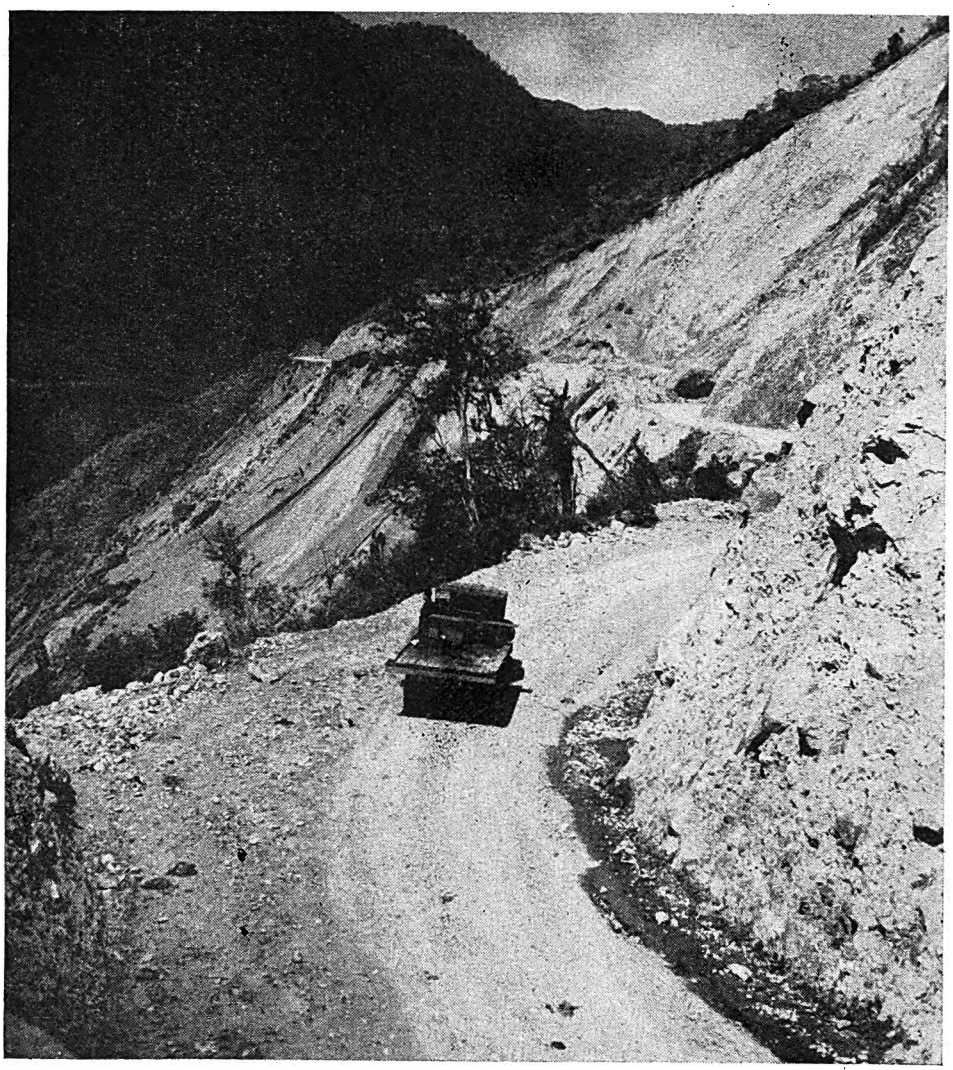
The section of the Pan American Highway south of Tambo continues southward for 179 miles to Loja. From Loja, the road runs west to San Pedro from where a section is projected to extend southward to La Tina, on the Peruvian border. Between San Pedro and the Peruvian border, only a poor dirt road and trail exists at present.

Owing to the fact that the terrain via the proposed San Pedro-Macara-La Tina route offers difficult engineering problems, various other routes have been suggested.

From La Toma, 22 miles west of Loja, a road has been constructed to within 9 miles of Cariamanga. As the distance between Cariamanga and Macara via a projected road is approximately 37 miles the La Toma-Cariamanga-Macara-La Tina road has been considered as a possible route of the Pan American Highway.

Another route discussed is via the San Pedro-Panupali-Santa Rosa road. At present, this road is completed as far as Panupali, and plans are that it shall be extended to Santa Rosa, from where a dry-season road runs to the Peruvian border.

Still another proposed route is the Estacion Cumbe-Pasaje-Puerto Bolivar road. At present, this road is completed as far as Giron, which is 27 miles from Estacion Cumbre, on the Pan American Highway, south of Cuenca. Between Giron and Puerto Bolivar, a distance of 91 miles, the road is under construction. From Machala, a short distance east of Puerto Bolivar, a road running to Santa Rosa is planned. From Santa Rosa, the dry-season road mentioned above runs to the Peruvian border.



OIAA photo

A section of the Quito-Esmeraldas road.

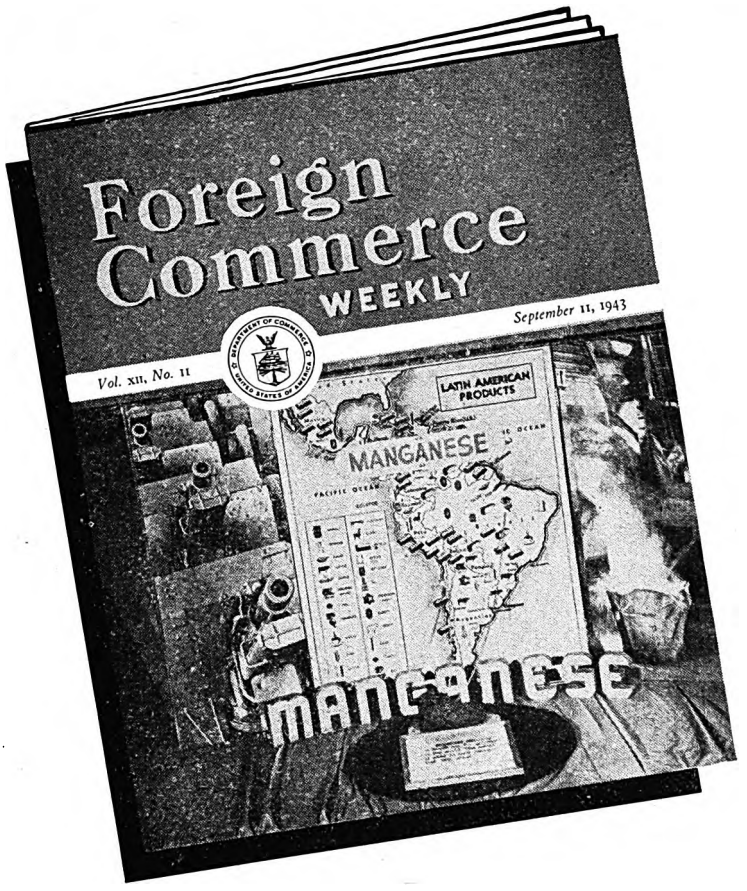
Other Roads

The roads branching, either west or east, from the Pan American Highway have been built for development purposes. As may be noted in table 4, no completed sections, while the exception of the 205-mile dry-weather Cuatro Esquinas-Guyaquil road, exceed a length of much more than 100 miles. Only one of the roads extending toward the coast—the Cuatro Esquinas-Guayaquil road, mentioned above—reaches a port and no road as yet reaches far into the oriente.

However, at present road surveying and construction toward completion of these roads leading west and east from the Pan American Highway are active projects. A United States contractor recently was awarded a contract for surveying the Quininde-Esmeraldas section of the Quito-Esmeraldas road, and other contracts have been awarded to United States contractors for construction on the Quevedo-Manta road and a 10-mile stretch of the Tambo (Basquerizo Moreno)-Alfaro (Duran) road. The South American Development Company, a North American mining company operating in southern Ecuador, is constructing the Giron-Pasaje section of the Estacion Cumbre-Puerto Bolivar road and the Panupali-Santa Rosa section of the San Pedro-Puerto Bolivar road.

☆U. S. GOVERNMENT PRINTING OFFICE: 1946—692769—293

Digitized by Google



$6.00
per year

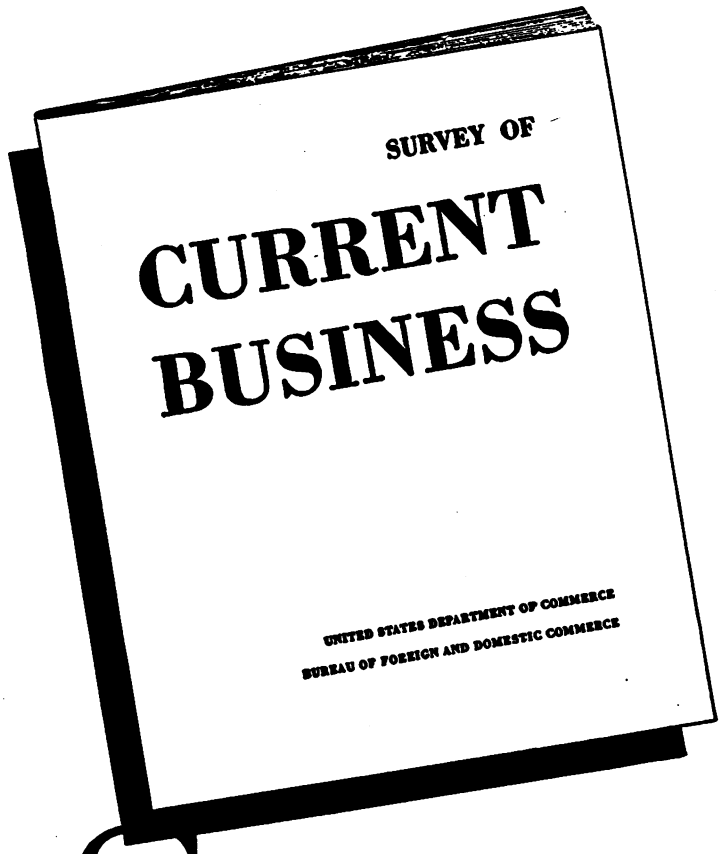
Foreign Commerce
WEEKLY

Foreign Commerce Weekly contains feature articles on timely subjects of particular interest to the foreign trader. Regular departments include news items by countries and commodities with sections devoted to foreign exchange, finance, tariffs and trade controls, wartime commodity controls, commercial-law notes, book reviews.

A sample copy will be sent, upon request to the
Bureau of Foreign and Domestic Commerce,
Washington 25, D. C.

$6.00 per year, from the Superintendent of Documents, Government Printing Office, Washington.

Digitized by Google



$2.00
per year

SURVEY OF CURRENT BUSINESS

THIS AUTHORITATIVE MONTHLY PERIODICAL makes easily available to businessmen over 2,200 comprehensive facts about production, stocks, orders, prices, sales, shipments, etc., of the industries of the United States by means of text, tables, charts, and index numbers.

A sample copy will be sent, on request to the
Bureau of Foreign and Domestic Commerce,
Washington, D. C.

$2.00 per year, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Digitized by Google

Domestic Commerce

written for

BUSINESSMEN . .

● Here is an authoritative monthly periodical written in the language of the American businessman. It is one of the principal organs of the Department of Commerce for disseminating information deemed of importance in maintaining a vigorous and dynamic free enterprise system.

● Domestic Commerce gives the reader an understanding of the progress and changing conditions of industry and business of the United States. Its writers are officials of this and other Government agencies, and specialists in the various subjects covered.

● Particular attention is given to developments in the field of post-war planning.

{ *A sample copy will be sent you upon request to the Bureau of Foreign and Domestic Commerce, Washington 25, D. C.* }

$1.00 per year . . . from the Superintendent of Documents

U. S. GOVERNMENT PRINTING OFFICE • WASHINGTON 25, D. C.

Digitized by Google

Documents Room

Industrial Reference Service

U. S. DEPARTMENT OF COMMERCE, HENRY A. WALLACE, *Secretary*
Bureau of Foreign and Domestic Commerce, AMOS E. TAYLOR, *Director*

Part 1. TRANSPORTATION and PUBLIC UTILITIES

INDIANA UNIVERSITY 1946

Available in Parts Covering Selected Services and Commodities
Annual Subscription $1.50. Price this report 5 cents
For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., or any of the Department's Field Offices

Volume 4—Part 1 | July 1946 | D 16342 | Number 12

Public Utility Gas Plants of Brazil

Arranged for publication by Guida Berrigan Hall, Transportation and Communications Division, Special Services and Intelligence Branch, Office of World Trade Promotion

Based on Reports by Ross E. Hoverter, American Embassy, Sao Paulo, and by R. F. Patterson and R. A. Wilson, Jr., American Embassy, Rio de Janeiro, Brazil

At the present time, only manufactured gas is distributed by the public utility gas plants of Brazil. The field of natural gas known to exist near Salvador, Baia, has not been developed. Bottled gas, while sold in the country, is not handled by the public utility gas plants.

There are seven public utility gas plants in Brazil—three under the operation of the Brazilian Traction Light and Power Company Limited, two controlled by a United States holding company, and two operated as independent plants. Details of the operation of each of these plants will be discussed in this report.

Sao Paulo, State of Sao Paulo

Sao Paulo is the only city in the Sao Paulo Consular District which is served by a public utility gas plant. All other cities in the district are dependent for domestic purposes on wood, charcoal, and, to a lesser degree, electricity. A Sao Paulo concern imports butane from Argentina and, after bottling it, distributes it for household consumption in the outskirts of the city where gas from the San Paulo Gas Company Limited is not available.

Campinas, a city of nearly 100,000 population, was formerly the site of a public utility gas plant, which has been abandoned.

During normal times, imported coal is used in the manufacture of gas in Sao Paulo. However, in recent years, domestically mined coal was substituted, which resulted in higher production costs because of the low calorie content of native coal and the higher internal transportation costs.

The gas-oil used in the manufacture of gas is obtained from Venezuela and the Netherlands West Indies.

Acetylene and oxygen gas, which are both produced in Sao Paulo for industrial uses only, are discussed separately later in this report.

The San Paulo Gas Company Limited, organized in London in 1870, has been a subsidiary of the Brazilian Traction Light and Power Company Limited of Toronto, Canada, since 1912. It supplies gas only to Sao Paulo proper. Many of the newer outlying districts of Sao Paulo are without gas facilities, as war conditions prevented extension of the gas mains and also resulted, in October 1942, in rationing to all consumers of gas on a basis of 80 percent of consumption in 1941.

The gas plant and three of its four holders are located in the center of the city of Sao Paulo. The capacities of these holders are: One of 500,000 cubic feet, one of 1,000,000 cubic feet, and one high pressure holder of 105,942 cubic feet. The capacity of the fourth holder is 2,000,000 cubic feet.

The following tabulation shows the number of consumers in each of three classifications, and the volume of sales to each group:

Gas Consumers and Volume of Sales in Sao Paulo

(Consumption in cubic meters[1] per year)

Class	Number of consumers	Consumption
Commercial	1,359	2,711,198
Industrial	796	3,275,814
Domestic	47,212	27,943,004
Total	49,367	33,930,016

[1] 1 cubic meter equals 35.314 cubic feet.

A uniform rate of 0.886 cruzeiro ($0.0443, U. S. currency) per cubic meter is charged to all classes of consumers.

Coal gas is manufactured in 31 Gibbons Regenerative Settings, each with 9 through "D" retorts measuring 21 by 15 inches by 20 feet, of an old design, and built in 1912, 1925, and 1929. The retorts must be reset after 1,500 to 1,800 days' use. Approximately 60 percent of the equipment in this plant is in good condition.

Carbureted water gas is manufactured from steam, coke, and gas oil in four C. W. Gas Plants, two of which were installed in 1906, and the others in 1927 and 1930. Most of the equipment used in these plants is of British manufacture, the remainder being United States and German makes. Approximately 70 percent of all of the equipment is considered to be in good condition.

The present daily average production of gas is 105,000 cubic meters, while the maximum daily production is 180,000 cubic meters. The gas is distributed through approximately 52 miles of high pressure and 386 miles of low pressure gas mains in the city of Sao Paulo.

As of December 31, 1944, there was a total of 49,667 house service connections of the all-American Standard Taper Thread B2-19-19 type. This total includes all private mains and curb services. The meters, which were installed as of the above date, include the following:

5 Lt.	Wet meters, cast iron case	1,667
10 Lt.	Wet meters, cast iron case	7,103
10 B.	Dry meters, cast iron case	41,488
30 B.	Dry meters, cast iron case	222
	Total	50,480

The minimum contractual pressure on inlet of meters is required to be 10/10ths of an inch water volume.

The heating value of the gas is measured on dry gas at zero degrees Centigrade and 760 mm. pressure. Although the normal standard is 5,000 kilogram-calories per cubic meter, under wartime conditions the Government authorized a reduction to 4,750 kilogram-calories per cubic meter.[1]

The byproducts evolved at the gas plant are coke, coal tar, oil tar, ammoniacal liquor, and retort carbon.

Both acetylene and oxygen gas are produced in the plants of the Companhia Aga Paulista de Gaz Acumulado S/A, a subsidiary of a Swedish com-

[1] 5,000 kilogram-calories per cubic meter equals 560 B.t.u. per cubic foot.

Digitized by Google

pany, which has its head offices in Stockholm. The acetylene gas is 99 percent pure and the oxygen gas is 100 percent pure and dry.

The equipment used in the production of the acetylene gas is of Swedish manufacture and comprises one high-capacity compressor which produces 20 cubic meters of gas per hour, 3 generators, 8 drying tubes, 2 purifiers, and a complete reservoir with 1,100 cubic meters capacity, all of which are in good condition.

In the production of oxygen gas the following equipment is used: Two compressors (German make), one with a capacity of 20 cubic meters of oxygen gas per hour, and one with a capacity of 30 cubic meters per hour. For each compressor there is a set of gas purifiers, gas driers, and tube filling machines, all of Swedish manufacture, but when equipment is again available, it is said these will have to be replaced.

There are 530 consumers, all commercial, for the acetylene and oxygen types of gas. Ninety percent of these users are located in the city of Sao Paulo.

The total monthly sales of acetylene gas average 5,500 kilograms (12,125 lb.), and of oxygen gas, 24,000 cubic meters. Acetylene gas is available in cylinders of 2½, 3½, 4, and 6½ kilograms (5½, 7⅞, 8, and 14½ lb.) capacity, while the capacity of each of the cylinders used for oxygen gas is 6 cubic meters.

Acetylene gas is sold for 19.50 cruzeiros ($0.95) per kilogram (2.2046 lb.) and oxygen gas for 4.60 cruzeiros ($0.23) per cubic meter.

Santos, State of Sao Paulo

The City of Santos Improvements Company, Limited, a subsidiary of the Brazilian Traction Light and Power Company Limited of Toronto, Canada, furnishes gas to the cities of Santos and Sao Vincent, where 917 commercial and 7,062 domestic users consume a daily average of 580,000 cubic feet of gas. The rate charged per cubic meter is 0.873 cruzeiro, or about 4 cents in United States currency.

The amount of coal used in the manufacture of the gas averages about 29 tons daily. Most of the coal is imported from the United Kingdom and the United States, but a small amount is received from domestic mines. The maximum daily production of the plant seldom exceeds 804,000 cubic feet of gas, while its maximum capacity is 1 million cubic feet.

About 152 miles of pipe lines are included in the system. The home service connections, which total 9,215, employ the ¾-inch diameter standard English thread pipe. All of the 9,870 meters in use are the wet type, with cast iron body. The pressure at point of consumption is 3 inches water gage.

Chemicals used at the plant include iron oxide, for sulphureted hydrogen extraction, and byproducts evolved are coke, breeze, light and heavy tar oils, and pitch.

Recife, State of Pernambuco

A British-owned company, the Pernambuco Tramways and Power Company Limited, furnishes gas as well as electric and transportation facilities to the city of Recife.

The gas customers are divided into five classifications and the following table indicates the number of consumers in each classification together with their consumption in 1944:

Consumption of Gas in Recife, 1944
(In cubic meters)

Classification	Number of consumers	Consumption
Residential	1,740	1,214,758
Commercial	239	609,560
Industrial	51	208,917
Government	73	176,518
Public utility	1	3,993
Total	2,104	2,213,746

The rate charged for gas is based on the price of the gas-coal imported from the United States. The present charge is 0.90 cruzeiro (4½ cents) per cubic meter, and applies to all types of consumers. The minimum bill charged approximates 50 cents.

Daily production of gas averages 11,520 cubic feet, with about 365 B.t.u. per cubic foot. Maximum daily production does not exceed 23,040 cubic feet. There are more than 70 miles of pipe lines in the Recife gas distribution system. The house connections are of galvanized steel pipe with Whitworth standard gas threads and range in size from ¾ inch up. The 2,104 gas meters in use consist of both the wet and dry types, with pressures of 2 to 4 inches at the water gage.

The coal used in the manufacture of the gas is imported from the United States, and approximately 12 tons are required for average daily production.

The regulations in effect have not been changed since the signing of the contract with the Pernambuco State Government on October 14, 1913, at which time the company commenced operations in Recife.

In the production of the gas, the chemicals used include caustic soda, rosin, and industrial alcohol, and the following byproducts are evolved: Coal-tar and distillation products of tar, oils, pitch, a disinfectant, and a paint used for protective coating.

All equipment in use in the gas plant is of British make and is reported to be in good condition.

Porto Alegre, State of Rio Grande Do Sul

The Porto Alegre company, known as Cia. Energia Electrica Rio Grandense, which has its head office in Rio de Janeiro, furnishes both gas and electricity to the city of Porto Alegre.

There are 2,200 gas customers in Porto Alegre. The following tabulation indicates the number of customers in each of the three classifications, and the cubic meters of gas consumed by each group during 1944:

Consumption of Gas in Porto Alegre, 1944
(In 1,000 cubic meters)

Type of consumer	Number of consumers	Consumption
Domestic	1,962	1,064
Commercial	192	601
Government	46	122
Total	2,200	1,787

The following rates per cubic meter of gas are in effect at present:

Present Gas Rates in Porto Alegre
(In cruzeiros per cubic meter)

	General (except municipal service)	*Municipal service*
First 100 cubic meters[1]	.90 (4½ cents)	—
101 to 300 cubic meters	.80 (4 cents)	—
301 to 500 cubic meters	.70 (3½ cents)	—
First 500 cubic meters		.70
Over 500 cubic meters	.60 (3 cents)	.60

[1] Approximate charge in United States currency $1.30 per 1,000 cubic feet.

The coal required for the manufacture of the gas is mined from the Rio Grande do Sul fields (Sao Jeronimo), and 35 tons are required daily for use in the Reed-Lamie horizontal retorts. These retorts were installed during the years 1930 and 1932. The coal has a heat content of 9,900 B.t.u. per pound, with a humidity of approximately 13 percent and sulfur 1 percent. A typical analysis of this coal shows 29 percent volatile matter, 42 percent fixed carbons, and 29 percent ash.

The daily production of gas averages 307,250 cubic feet (8,700 cubic meters). The maximum production capacity of the plant is 317,835 cubic feet (9,000 cubic meters).

British standard pipe, extending for 33 miles and ranging in diameter from 2 to 12 inches, is included in the system. The average size of the house connections is 1 inch. While some connections are ¾ inches in diameter, this size has been condemned. Other sizes in use are 1¼, 1½, 2½, and 3 inches in diameter. The pipeline pressures, with the booster station in operation, are 145 mm. and 4 mm. water gage.

At the end of 1944, there were 2,238 meters connected, all of which were the dry type.

The regulations and standards used in governing the operations of the Porto Alegre gas plant are based on the concession contract of September 1928.

The chemicals required in the production of the gas at this plant are iron oxide, wash oil, sulphuric acid, caustic soda, and castor oil. From the byproducts, three residues—raw tar, light oil, and coke—are evolved. These are refined into benzol, creosote oils, tar paints, and tars.

In addition to the distribution system

Digitized by Google

at Porto Alegre, 6-inch tank feeder lines are in use with a daily capacity of more than 9,000 cubic meters. A booster pump station raises a nominal pressure of 100 mm. of water to 145 mm.

Rio de Janeiro, Federal District

Gas is furnished to 110,766 customers in Rio de Janeiro by the Societe Anonyme du Gas de Rio de Janeiro, a subsidiary of the Rio de Janeiro Tramway, Light and Power Company Limited, of Toronto, Canada, which in turn is a wholly owned subsidiary of the Brazilian Traction Light and Power Company Limited of Toronto, Canada. The three classes of consumers of gas in Rio de Janeiro number 4,316 commercial, 1,399 industrial, and 105,051 domestic. The amount of gas consumed by these three groups totaled 99,623,586 cubic meters in 1944, of which the commercial customers used 11,468,950 cubic meters and the industrial and domestic users consumed 4,725,005 and 83,429,631 cubic meters, respectively.

A flat rate of 0.756 cruzeiro (about 3.7 cents) per cubic meter is charged to all types of gas consumers in Rio de Janeiro.

The average heat content of gas is 4,300 calories per cubic meter at zero degrees Centigrade, 760 mm. Daily production averages 300,000 cubic meters, with 400,000 cubic meters the maximum capacity of the plant.

In the system there are approximately 48 miles of high-pressure pipe lines, 12 miles of medium pressure, and approximately 610 miles of low pressure, or an approximate total of 670 miles of gas pipe lines.

The meters in use, which total 111,965, are of the dry type with cast iron casings and with a pressure of 70 mm. water column.

No standards or regulations are set by the Rio gas company.

The United Kingdom and the United States furnish most of the 400 tons of coal required daily by the gas plant. A small amount of domestically mined coal is also used. The daily requirement of 31 tons of gas oil is imported from Venezuela. The byproducts of the gas plant are tar, tar oils, pitch, disinfectants, and paints. The chemicals used by the plant are rosin and caustic soda.

Belem, State of Para

The Para Gas Company Limited (Companhia de Gas Paranese Ltda.), the head offices of which are in Edinburgh, Scotland, has been supplying gas to Belem since the company was established in 1865. The Para Electric Railways and Lighting Company Limited now holds practically all the stock of the gas company and expects to acquire full ownership before the end of 1946. Although the directorates are different, the gas company and the electric company are operated jointly.

Two gas holders, totaling 3,500 cubic meters, are included in the system. There are 421 customers, and the monthly consumption of gas averages 27,000 cubic meters, all being used for domestic purposes. However, the low quality of the gas and the irregular service are given as reasons for the loss of 59 customers during a 6-month period in 1945.

A flat rate of 0.9376 cruzeiro (approximately 5 cents) per cubic meter is charged to all gas customers in Belem, who also may rent gas stoves from the gas company at charges of 50 to 75 cents per month, according to the type of stove desired.

The daily production of gas in the Belem plant varies from 1,500 to 2,000 cubic meters; and the average heat content of the gas is estimated to be 250 B.t.u. per cubic foot.

In the distribution system, the pipe sizes, all of which are British standard makes, range from 2 inches to 12 inches. The house connections are either ¾-inch or 1-inch. The meters used total 450; they are all quite old, and of the wet type.

In prewar days, coal imported from the United Kingdom was used in the manufacture of the gas. Today, however, the company is using wood and oil-cake, the latter being residuals of oil nuts. The present daily fuel consumption averages 20 cubic meters of wood and 500 kilograms (1,102.31 lb.) of oil-cake, in place of an estimated 6 tons of coal.

Inasmuch as the Para Gas Company does not hold a franchise, no special regulations or standards are in effect.

Iron oxide, employed as a purifying agent, is the only chemical used by the gas plant, and since wood and oil-cakes are the fuels used, no byproducts are evolved in the manufacture of the gas. When coal was the fuel used, however, from 60 to 100 tons of coke were produced as a byproduct. The coke was absorbed by the local market.

Niteroi, State of Rio de Janeiro

Sociedade Anonima Gas de Niteroi—the Niteroi Gas Company—forms a part of Organizacao Henrique Lage, and supplies 2,000 users in Niteroi with a monthly average of 130,000 cubic meters of gas. Commercial customers use almost 20,000 cubic meters of gas; the remainder is consumed for domestic purposes. There is no difference in the charge for gas sold to commercial or domestic customers, and at the present time a rate of 0.75 cruzeiro (3¾ cents) applies.

The Niteroi gas plant manufactures both retort and carbureted water gas. The equipment used in the production of the retort gas was installed in 1887. One of the two retorts used in the manufacture of carbureted water gas was installed in 1907 and the other in 1944.

A maximum daily production of 6,000 cubic meters of gas is possible at the plant, but the daily average production does not exceed 5,000 cubic meters. The average heat content ranges from 3,500 to 4,500 kilogram-calories per cubic meter.

The pipe line sizes vary from 2 to 12 inches, and the pipe lines extend for approximately 422 miles. The house service connections are of 1- and 1½-inch pipe, with 11 threads to the inch. All of the 2,200 meters in use are of United States manufacture and the pressure at the point of consumption is 200 mm.

The Niteroi Gas Company uses coal mined at Sta. Catarina (Brazil); the daily consumption approximates 10 to 12 metric tons. No chemicals are used and no byproducts are evolved.

No standards or regulations are in effect.

Bottled Gas

Only one company, Companhia Ultragaz S.A. of Rio de Janeiro, is known to distribute bottled gas in Brazil at this time. This gas, a mixture composed of 80 percent butane and 20 percent propane, has been received almost entirely from Argentina in recent years. However, the company announced in 1945 that beginning January 1, 1946, it would be able to increase its distribution of bottled gas, as a contract had been signed with a United States firm for extensive importation of such gas.

The gas is sold in cylinders of 54-kilogram capacity (119 lb.) and in bottles of 13-kilogram capacity (28.66 lb.).

At the present time there are 9,025 domestic consumers and 125 industrial users served with this type of gas. The company serves Rio de Janeiro, Sao Paulo, Petropolis, Teresopolis, Niteroi, and Baia.

A local company, Auto Mercantil, is arranging to enter Brazil's bottled-gas field, and reports that it soon will receive 200 tons of butane gas in 300-pound returnable drums from the United States. It is understood that the company plans to furnish the first gas for driving motor vehicles; later shipments will be used for cooking purposes.

★ U. S. GOVERNMENT PRINTING OFFICE: 1946—692770—310

Digitized by Google

Domestic Commerce

written for

BUSINESSMEN . .

● Here is an authoritative monthly periodical written in the language of the American businessman. It is one of the principal organs of the Department of Commerce for disseminating information deemed of importance in maintaining a vigorous and dynamic free enterprise system.

● Domestic Commerce gives the reader an understanding of the progress and changing conditions of industry and business of the United States. Its writers are officials of this and other Government agencies, and specialists in the various subjects covered.

● Particular attention is given to developments in the field of post-war planning.

[*A sample copy will be sent you upon request to the Bureau of Foreign and Domestic Commerce, Washington 25, D. C.*]

$1.00 per year . . . from the Superintendent of Documents

U. S. GOVERNMENT PRINTING OFFICE • WASHINGTON 25, D. C.

Digitized by Google

cuments Room

Industrial Reference Service

U. S. DEPARTMENT OF COMMERCE, HENRY A. WALLACE, *Secretary*

Office of International Trade, ARTHUR PAUL, *Director*

Part 1. TRANSPORTATION and PUBLIC UTILITIES

Available in Parts Covering Selected Services and Commodities
Annual Subscription $1.50. Price this report 5 cents
For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., or any of the Department's Field Offices

Volume 4—Part 1 August 1946 Number 13

INDIANA UNIVERSITY 1946

D 16522

Railways of Venezuela

By Seymour T. R. Abt, Transportation and Communications Division, Special Services and Intelligence Branch

Based on American consular reports, official Venezuelan documents and reports, and other sources

Venezuela has an area of 352,143 square miles which may be divided into four topographical regions: (1) The Andean highlands extending north and east in an arc from Colombia in the southwest and continued by the coastal mountains to the tip of the Paria Peninsula; (2) the "llanos" or broad, low, alluvial plain extending from the base of the Andes east to the Orinoco delta; (3) the Lake Maracaibo basin, a V-shaped lowland enclosed in a fork of the Andes; and (4) the Guiana highlands, largely unexplored, lying south and east of the Orinoco. Distinct but less important regions are the Segovia uplands of northwestern Venezuela and the delta of the Orinoco. The climate of Venezuela is varied, depending largely on the elevation. The population of some 4,000,000 is about 80 percent rural, and located mainly near the coast.

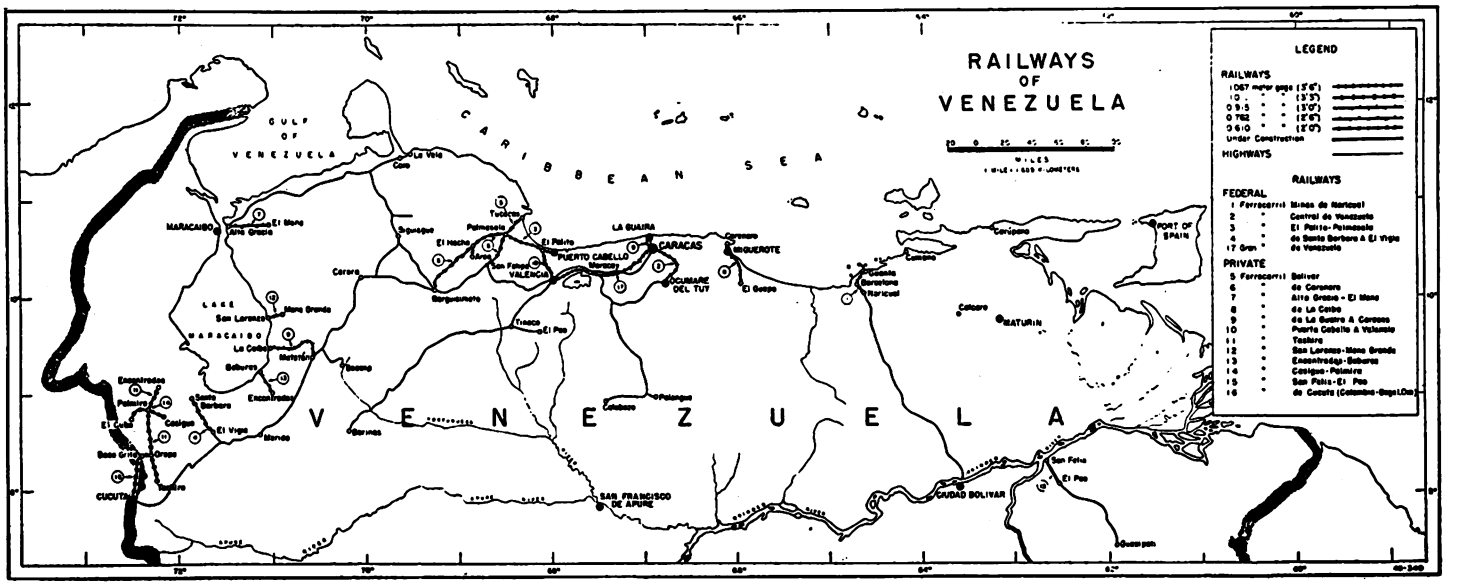
Economy

Petroleum is Venezuela's chief export commodity, but most of the population is engaged in agriculture. In general, the country is self-sufficient in basic foodstuffs, except rice, wheat, flour, milk, and oatmeal. There are some factories producing a variety of items for local consumption, including textiles, shoes, clothing, leather, beer, paints, canned fish, salt, cigarettes, and tires.

Transportation

A highway system of 3,750 miles of all-weather roads and 1,600 miles of unimproved, dry-weather roads unites the principal populated areas, connects with the Colombian highway system, and is the principal means of domestic freight and passenger transportation. Several organized trucking lines are operated. The Compania Anonima "Lineas A.R.C." offers a bus service between Caracas and most of the important cities in the western and Andean states.

Four trunk pipelines totaling 344 miles in length move oil from producing fields in eastern Venezuela to the shipping ports.



Digitized by Google

Thirty-eight widely dispersed airports in Venezuela are served on scheduled flights by international and domestic airlines. Maracaibo, Coro, Maiquetia (La Guaira), Barcelona, and Maturin have international service by Pan American Airways; Maracaibo and Maiquetia are served by the Netherlands' KLM. Pan American offers daily service to points east and west of Venezuela and daily north and south flights between Maiquetia and Miami. KLM offers three round-trip flights per week between Maracaibo and Aruba, and six between Maiquetia and Miami via Curacao. All of these airports are also served by the government-owned *Linea Aeropostal Venezolana* and the *Linea Aerea TACA de Venezuela;* all except Coro are served by *Aerovias Venezolanas, S. A.* Two other airports are served by all three domestic airlines, 8 by two companies, and 19 by one. Other airports, among them the 26 maintained by petroleum companies and used by their own aircraft, are served on a charter basis by *Aerovias Venezolanas, S. A.* There are Customs facilities at Maracaibo, Maiquetia, Maturin, and San Antonio del Tachira.

Steamer services connect Venezuelan ports with the United States, Canada, Curacao, the coasts of South America the United Kingdom, Sweden, Spain and Portugal. The Government-controlled *Compania Anonima Venezolana de Navegacion* operates a coastal and river service touching all ports of any importance. Schooners and other small vessels ply the coasts and carry goods to and from Caribbean islands. The Orinoco and its tributaries, furnishing some 6,500 miles of navigable rivers, drain approximately four-fifths of the country.

TABLE 1.—*Venezuelan Railways*[1]

Railway	Ownership	Length (Kilometers)		Gage (meters)
COMMON CARRIERS				
Gran Ferrocarril de Venezuela [2]	Government	Caracas-Valencia	179	1.067
F. C. Central de Venezuela	Government	Caracas-Ocumare del Tuy	83	1.067
F. C. El Palito-Palmasola [3]	Government	El Palito-Palmasola	55	1.067
F. C. de Santa Barbara A El Vigia	Government	Santa Barbara-El Vigia	60	1.000
F. C. de La Guaira A Caracas	La Guaira & Caracas Rly. Co., Ltd.	La Guaira-Caracas	37	0.915
F. C. de Puerto Cabello A Valencia [5]	Puerto Cabello & Valencia Rly. Co., Ltd.	Puerto Cabello-Valencia	55	1.067
F. C. Bolivar	Bolivar Rly. Co., Ltd.	Barquisimeto-Tucacas [4]	146	0. 610
		Palmasola-San Felipe [4]	39	0. 610
		El Hacha-Aroa	13	0. 610
		small branches to factories	21	0. 610
Gran F. C. de La Ceiba	C. A. Gran F. C. de La Ceiba	La Ceiba-Motatan	82	0.915
Gran F. C. del Tachira	C. A. Gran F. C. del Tachira	Encontrados-Tachira	120	1.000
		Orope-Boca	17	1.000
F. C. de Carenero	C. A. F. C. de Carenero	Carenero-El Guapo	54	0.915
Total			961	
INDUSTRIAL				
F. C. Minas de Naricual	Government	Guanta-Naricual	36	1.067
F. C. San Lorenzo-Mene Grande	Caribbean Petroleum Co.	San Lorenzo-Mene Grande	17	0.610
F. C. Alta Gracia-El Mene	British Controlled Oilfields, Ltd.	Alta Gracia-El Mene	56	0.610
F. C. Encontrados-Bobures	Colon Development Co.	Encontrados-Bobures	34	0.610
F. C. Casigua-Palmira	Colon Development Co.	Casigua-Palmira	28	0.610
Total			171	

[1] Those in operation. Several other short lines exist, but they are inactive, according to latest reports.
[2] Formerly German; taken over by Government in 1943.
[3] Operated by Bolivar Railway.
[4] Rack-rail sections.
[5] Owned by Bolivar Railway.

Venezuelan Railways

There are several reasons why railway development in Venezuela has not been as rapid and is not as advanced as in other Latin American republics. The country's varied topography has made construction difficult and maintenance costly. Competition has been keen, both from the excellent natural waterways and the government-encouraged truck operation. The concentration of the population along the coast has rendered internal rail construction less necessary, and the excellent harbors have made water transportation often preferable to that by rail along the coast.

The railways do not by any means form a unified system. There are ten common carriers and five known industrial lines in operation, but four different gages are in use and three of these must be used for rail shipment from La Guaira to Barquisimeto. (The Bolivar Railway has agreed, under contract with the Government, to convert to 1.067-meter gage in the near future.) To complicate matters, the Caracas terminals of the Venezuela Central Railway and the Great Railway of Venezuela are two miles apart, and hence must transfer goods by truck despite the fact that they have the same gage. As a result of all these factors, the railways generally have declined in importance and financial position in recent years. During the war, despite the inability of motor transportation interests to secure new equipment and spare parts, the railways' requirements for materials and equipment for maintenance and repair were neither large nor urgent.

Recent Developments

In October 1945 a new administration came into power in Venezuela by military force. Since that time there have been indications that the new government is seriously interested in improving the country's transportation facilities. Decree No. 154, effective January 29, 1946, created the autonomous State Railways Administration under the Ministry of Communications, and made it responsible for the maintenance, administration, exploitation, and development of nationally-owned railroads and those which may in the future be acquired by the nation. Capital assigned included 8,000,000 bolivars - Gran F. C. de Venezuela. 5,200,000 bolivars - F. C. Central, 3, 395,000 bolivars - F. C. Santa Barbara-El Vigia, and 8,400,000 bolivars - F. C. El Salito-Palma Sola. (At present—June 1946—1 bolivar equals approximately $0.30 U. S. currency.) Balances remaining in budgetary items covering railway expenses, which had been appropriated to the Ministry of Public Works, were transferred to the Administration. To direct the Administration's work, a Management Council was set up with certain safeguards to ensure administrative probity.

It is as yet too early to determine just how far and in what direction the State Railways Administration will go.

Digitized by Google

Officials, however, have spoken of new construction and purchase of rolling stock and motive power. Diesel-electric locomotives and motor railcars have been mentioned specifically, but no actual orders have been reported.

Construction

The construction of a railroad to serve the cattle country of the *llanos* has been under consideration since 1936. A private group, claiming to represent considerable capital, has been attempting for several years to obtain a Federal concession and the necessary additional capital to undertake the project. The reactions of outsiders have been varied. The present government does not oppose the project, but it has not yet taken any definite steps to advance it. However, it is too early to know exactly what will be done here.

Construction of a railroad by the Iron Mines Company of Venezuela, a subsidiary of Bethlehem Steel Corporation, is probably now under way or soon to be started. This road, of 1.435-meter gage (U. S. standard), will run from San Felix to El Pao, and be 69 kilometers long. It will be a mining road, not a common carrier.

Purchasing Methods

Before the war purchases for the Government railways were made by the Ministry of Public Works. Under the new set-up purchases will probably be made by the State Railway Administration, Ministerio de Comunicaciones, Caracas.

In general, the foreign-owned railways formerly purchased through their main offices upon receiving orders issued by their managers. Purchases for the Venezuelan-owned private railways were made by the managers. Some of the companies had purchasing offices apart from their main offices. The prewar main office, or the purchasing office if separate, of each company is listed below together with the railroad's local office.

TABLE 2.—*Venezuela Railways—Addresses*

	Local	Main or Purchasing
The Bolivar Railway Co., Ltd.	Barquisimeto	Dashwood House, 69 Old Broad St., London, E. C. 2
The Puerto Cabello & Valencia Railway Co., Ltd.	Valencia	Dashwood House, 69 Old Broad St., London, E. C. 2
The La Guaira & Caracas Railway Co., Ltd.	Caracas	Dashwood House, 69 Old Broad St. London, E. C. 2
Compania Anonima Gran F. C. de La Ceiba	Maracaibo	Maracaibo
C. A. Gran F. C. del Tachira	Maracaibo	Maracaibo
C. A. F. C. de Carenero	Carenero	Caracas
Caribbean Petroleum Co.	Maracaibo	Asiatic Petroleum Co., 65 Broadway, NYC, N.Y.
Colon Development Co.	Maracaibo	Asiatic Petroleum Co., 65 Broadway, NYC, N.Y.
British Controlled Oilfields, Ltd.	Maracaibo	River Plate House, Finsbury Circus, London, E. C. 2

TABLE 3.—*Venezuelan Railways—Passenger Traffic*

Railway	1938	1943	1944
Gran F. C. de Venezuela	77,885	45,337	53,913
F. C. Central de Venezuela	not available	1,223,170	1,682,344
F. C. El Palito-Palmasola	Not in operation	12,376	11,716
F. C. de Santa Barbara A El Vigia	40,564	61,106	91,297
F. C. de La Guaira A Caracas	26,822	6,581	1,026
F. C. de Puerto Cabello A Valencia	4,077	14,885	13,911
F. C. Bolivar	42,438	36,334	44,377
Gran F. C. de la Ceiba	68,516	34,306	27,535
Gran F. C. del Tachira	57,514	84,638	92,340
F. C. de Carenero	9,407	10,295	11,878

Permanent Way and Structures

The railways of Venezuela generally are well-constructed and in many instances the roads' officials have kept up proper maintenance. Most of the railways, however, run over mountainous terrain, so that steep grades, curves, and tunnels are common. The annual rains cause landslides, fill drainage ditches and make the rivers overflow so that the waterways under many bridges are blocked.

Available pertinent information on Venezuelan railways follows:

GRAN F.C. DE VENEZUELA—Minimum curve radius: 75 meters. Maximum grade: 2.2 percent. Ballast: Mostly stone. Ties: Metal. Rails: 47 lbs. / yd. Signals: Station dispatches with written instruction.

Culverts and short bridges: 747; length, 716 meters. Bridges: Steel, 113; length 1,686 meters. Viaducts: 46; length 2,368 meters. Tunnels: 86; length 6,249 meters; Stations: 26.

Condition of track: Fair.

F.C. CENTRAL DE VENEZUELA—Minimum curve radius: 50 meters. Maximum grade: 4.0 percent. Ties: Wood. Rail: 50 lbs. / yd. Signals: Station dispatches with written instructions.

Culverts and short bridges: 197; length 358 meters. Bridges: 33; length 535 meters. No viaducts. Tunnels: 14, length 482 meters. Stations: 18.

Condition of roadbed: Fair. The Government has spent considerable sums in rehabilitation of roadbed and structures since it took over the road in 1936.

F.C. EL PALITO-PALMASOLA—Minimum curve radius: 350 meters. Maximum grade: 1.0 percent Ballast: Crushed rock well laid. Ties: Local wood, with creosoted yellow pine (U. S.) on trestles. Rails: 50 lbs. / yd. Signals: Station dispatches with written instruction.

Culverts and short bridges: 106. length 148 meters. Bridges: Steel, 30; length 694 meters. No viaducts or tunnels. Stations: 6.

This road was opened to traffic in 1942. It is laid largely in swampland In the rainy season drainage is sometimes inadequate.

F.C. DE SANTA BARBARA A EL VIGIA—Minimum curve radius: 50 meters. Maximum grade: 2.0 percent. Ties: Wood. Rails: 40 lbs. / yd. Signals: Station dispatches with written instructions.

Culverts and short bridges: 47, length 125 meters. Bridges: 26, length 467 meters. No viaducts or tunnels. Stations: 8.

Condition of roadbed: Poor; sections frequently flooded in June and July.

F.C. DE LA GUAIRA A CARACAS—Minimum curve radius: 43 meters. Maximum grade: 3.75 percent. Ballast: Stone. Ties: Wood. Rails: 65 lbs. / yd. Signals: Absolute electric block. Line is electrified, and uses overhead trolley contact, but the railroad still operates steam and motor engines.

Culverts and short bridges: 151, length 181 meters. Bridges: 14, length 132 meters. Viaduct 1, length 150 meters. Tunnels: 8, length 380 meters. Stations: 9.

Topography of the country is very mountainous, and curves and reverse curves are separated by very short tangents or none at all. Landslides and washouts follow heavy rains. Maintenance, however is good, and carried out by a large working force. Every foot of line is inspected several times a day by track walkers.

F.C. DE PUERTO CABELLO A VALENCIA—Minimum curve radius: 92 meters. Maximum grade: 8.0 percent (rack rails for 4 kilometers). Ballast: Rock. Ties: Wood. Rails: 55 lbs. / yd., 70 lbs. / yd. on upgrade. Signals: Sta-

Digitized by Google

tion dispatches with written instructions.

Culverts and short bridges: 216, length 324 meters. Bridges: 33, length 916 meters. No viaducts. Tunnel: 1, length 76 meters. Stations: 8.

Condition of track and roadbed: Generally good.

F.C. BOLIVAR—Minimum curve radius: 47 meters. Maximum grade: 5.27 percent. Ballast: Slag and earth. Ties: Wood and steel, about 50 percent each. Rails: Height 90 millimeters, height of head 25 millimeters, width of head 45 millimeters, base of rail 80 millimeters, weight 40 lbs. / yd.

Cuverts and short bridges: 283, length 425 meters. Bridges: 518, length 2,119 meters. No viaducts or tunnels. Stations: 26.

Sharp curves and reverse curves are frequent. Drainage is not good.

GRAN F C DE LA CEIBA—Minimum curve radius: 80 meters. Maximum grade: 3.0 percent. Rails: 40 lbs. / yd. Signals: Station dispatches with written instructions.

Culverts and short bridges: 171, length 495 meters. Bridges 19, length 446 meters. No viaducts or tunnels. Stations: 4.

GRAN F.C. DEL TACHIRA—Minimum curve radius: 93 meters. Maximum grade: 2.6 percent. Ballast: Sand, gravel, and stone. Ties: Wood. Rails: 40 lbs. / yd. Signals: Station dispatches with written instructions.

Culverts and short bridges: 761, length 2,261 meters. Bridges: 18, length 659 meters. No viaducts. Tunnel: 1, length 40 meters. Stations: 11.

Floods frequently damage tracks.

F.C. DE CARENERO—Minimum curve radius: 100 meters. Maximum grade: 2.5 percent. Rails: 40 lbs. / yd. Signals: Station to station dispatches with written instructions.

Culverts and short bridges: 42, length 135 meters. Bridges: 46, length 735 meters. No viaducts or tunnels. Stations: 7.

F.C. MINAS DE NARICUAL—Minimum curve radius: 125 meters. Maximum grade: 2.5 percent. Rails: 40 lbs. / yd.

Bridges and viaducts: 6, length 265 meters. Stations: 5.

F.C. SAN LORENZO-MENE GRANDE—Minimum curve radius: 25 ft. in sidings, 60 ft. in main line. Maximum grade: 1 percent. Ballast: gravel and rock. Ties: Steel. Rails: 30 lbs. / yd.

Culverts: Steel. Bridges: Steel and wood. No tunnels.

F.C. ENCONTRADOS-BOBURES—Minimum curve radius: 60 ft. Maximum grade: 1 percent. Ballast: Dirt. Ties: Steel. Rails: 50 lbs. / yd.

Culverts: Steel. Bridges: Wood. No tunnels.

F.C. CASIGUA-PALMIRA—Minimum curve radius 60 ft. in sidings, 100 ft. in main line. Ballast: Dirt, some gravel. Ties: Steel. Rails: 50 lbs. / yd. Culverts: Steel. Bridges: Wood. Culverts and bridges: 45. No tunnels.

TABLE 4.—*Venezuelan Railways—Freight Traffic (metric tons)*

Railway	1938	1943	1944
Gran F. C. de Venezuela	58,874	66,746	72,484
F. C. Central de Venezuela	Not available	15,644	14,805
F. C. El Palito-Palmasola	Not in operation	18,278	20,008
F. C. de Santa Barbara A El Vigia	25,440	47,675	44,597
F. C. de La Guaira A Caracas	101,513	182,397	179,521
F. C. de Puerto Cabello A Valencia	52,936	99,215	101,103
F. C. Bolivar	11,324	23,099	23,724
Gran F. C. de la Ceiba	31,729	8,763	5,350
Gran F. C. del Tachira	45,494	53,841	66,333
F. C. de Carenero	9,981	11,129	11,316

TABLE 5.—*Venezuelan Railways—1944 Financial Data (Bolivars)*

Railway	Capital	Gross Income	Operating Expenses
Gran F. C. de Venezuela	21,000,000	1,225,923	1,132,619
F. C. Central de Venezuela	5,155,033	409,724	595,422
F. C. El Palito-Palmasola	8,398,561	237,117	161,262
F. C. de Santa Barbara A El Vigia	3,473,618	810,645	647,290
F. C. de La Guaira A Caracas	18,180,000	1,674,821	1,154,019
F. C. de Puerto Cabello A Valencia	16,160,000	1,038,205	766,393
F. C. Bolivar	30,856,000	579,051	581,510
Gran F. C. de la Ceiba	8,000,000	94,416	151,564
Gran F. C. del Tachira	11,200,000	2,582,577	2,148,259
F. C. de Carenero	4,000,000	227,698	243,499

Equipment and Facilities for Maintenance

Data of Venezuelan railway equipment and the facilities for their maintenance are incomplete and conflicting. The information that follows is believed to be the most reliable, although it is taken from various sources. The statistics are for the years 1943 and 1944:

GREN F.C. DE VENEZUELA—Locomotives: 6 steam. Passenger cars: 21, total capacity 722. Freight cars: 111, capacity 15-20 tons each. Motor coaches: 2, total capacity 54.

Condition of equipment: Good.

Repair shop: Caracas, equipment old. Terminals: Caracas, Valencia. Industrial sidings: Maracay, Valencia.

F.C. CENTRAL DE VENEZUELA—Locomotives: 6 steam. Passenger cars: 5, total capacity 160. Freight cars: 73, capacity 8-12 tons each. Motor Coaches: 11, total capacity 336.

Repair and construction shop: Caracas, builds coaches and freight cars. Carpenter shop with little materials. Terminals: Caracas and Ocumare del Tuy.

F.C. EL PALITO-PALMASOLA—The only rolling stock consists of 40 banana cars of 15-ton capacity each. Equipment of F.C. DE PUERTO CABELLO A VALENCIA is also used, as are the Valencia shops of that line.

F.C. DE SANTA BARBARA A EL VIGIA—Locomotives: 7 steam. Passenger cars: 4, capacity 116 total. Freight cars: 41, as follows: 6 boxcars (10 tons each), 10 boxcars (8 tons each), 9 boxcars (5 tons each), 5 gondolas (10 tons each), 6 tank cars, 2 stock cars, 2 baggage cars, one special milk and butter car. Motor coaches: 3, total capacity 102.

Repair shop: Santa Barbara fairly good. Terminal: Santa Barbara.

F.C. DE LA GUAIRA A CARACAS—Locomotives: 4 steam. Passenger cars: 27, total capacity 540. Freight cars: 68 box, capacity 15 tons each, 54 flat, capacity 15 tons each. Electric motor coaches: 4, total capacity 146. Also 6 electric *Acoplados*, apparently units of more than one car each.

Equipment: Well maintained.

Repair shop: Caracas. Terminals: La Guaira, Caracas. Yard tracks and industrial sidings: Caracas, Catia de la Mar, La Guaira.

F.C. DE PUERTO CABELLO A VALENCIA—Locomotives: 11 steam. Passenger cars: 9, total capacity 225. Freight cars: 65 box, 35 open, capacity 15 tons each. Motor coaches: 5, total capacity 100.

Condition of equipment: Good

Repair shop and roundhouse: Valencia, equipment old but usable. Terminals: Puerto Cabello, Valencia. Spurs: From Puerto Cabello to docks (1 km.) and to Borburata (6 km.).

F.C. BOLIVAR—Locomotives: 8 steam. Passenger cars: 8, total capacity 160. Freight cars: 137, capacity 5 tons each. Motor coaches: 9, total capacity 180.

Locomotive shop: Aroa. Terminals: Tucacas, San Felipe, Aroa, Barquisimeto, Palma Sola, El Hocha. All are small.

GRAN F.C. DE LA CEIBA—Locomotives: 7 steam. Passenger cars: 11, total capacity 400. Freight cars: 32, total capacity 250 tons. Motor coaches 5, total capacity 185. Also 2 *Acoplados*, apparently units of more than one car each.

Large investments in equipment were made in years 1935-39.

Shop: La Ceiba.

Digitized by Google

GRAN F.C. DEL TACHIRA—Locomotives: 13 steam. Passenger cars: 14, total capacity 286. Freight cars: 86, total capacity 1,133 tons. Motor coaches: 3, total capacity 102.

Equipment is well maintained.

Repair shop: Encontrados.

F.C. DE CARENERO—Locomotives: 6 steam. Passenger cars: 7, total capacity 150. Freight cars: 42, total capacity 410 tons. Motor coach: 1, capacity 24. Also one *Acoplado,* apparently a unit of more than one car.

Shop: Carenero.

F. C. MINAS DE NARICUAL—Locomotives: 3 steam. Passenger cars: 8. Freight cars: 50.

Traffic

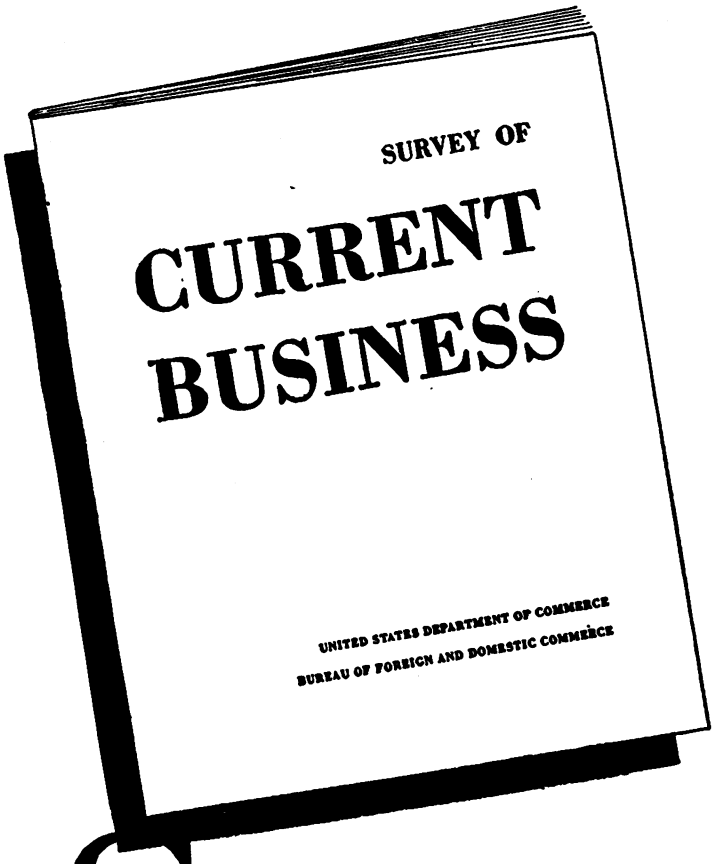
Traffic statistics are presented for 1938, the last complete prewar year, and 1943 and 1944, the latest years for which figures are available. The stimulus of the war is clearly shown in the freight data. Decreases in passenger traffic on some of the lines are probably attributable to the curtailment in service that the increased freight traffic necessitated. See tables 3 and 4.

Financial Results

Revenues and profits were also increased by war conditions. It remains to be seen whether the railroads will be able to continue profitable operation in the coming years. Truck and bus competition undoubtedly will be more severe than ever before as soon as equipment and parts are again available in the necessary quantities. See table 5.

☆U. S. GOVERNMENT PRINTING OFFICE: 1946—707793—13

Digitized by Google



$2.00
per year

SURVEY OF CURRENT BUSINESS

THIS AUTHORITATIVE MONTHLY PERIODICAL makes easily available to businessmen over 2,200 comprehensive facts about production, stocks, orders, prices, sales, shipments, etc., of the industries of the United States by means of text, tables, charts, and index numbers.

A sample copy will be sent, on request to the
Bureau of Foreign and Domestic Commerce,
Washington, D. C.

$2.00 per year, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Digitized by Google

Department of Commerce
Field Service

Albany 7, N. Y., Room 409, County Courthouse.

Atlanta 3, Ga., P. O. Box 1595.

Baltimore 1, Md., 803 Cathedral St.

Boston 9, Mass., 1800 Customhouse.

Buffalo 3, N. Y., 242 Federal Bldg.

Charleston 3, S. C., 310 Peoples Bldg.

Charleston 1, W. Va., 612 Atlas Bldg.

Chattanooga 2, Tenn., 924 James Bldg.

Chicago 4, Ill., 357 U. S. Courthouse.

Cincinnati 2, Ohio, 1204 Chamber of Commerce Bldg.

Cleveland 14, Ohio, 1286 Union Commerce Bldg.

Columbus 1, Ohio, 1037 N. High St.

Dallas 2, Tex., 602 Santa Fe Bldg.

Denver 2, Colo., 302 Midland Savings Bldg.

Des Moines 9, Iowa, 518 Grand Ave., Room 300.

Detroit 26, Mich., 1028 New Federal Bldg.

Duluth 5, Minn., 310 Christie Bldg.

El Paso 7, Tex., Chamber of Commerce Bldg.

Fargo, N. Dak., 207 Walker Bldg.

Grand Rapids 2, Mich., 736 Keeler Bldg.

Hartford 6, Conn., 436 Capitol Ave.

Houston 14, Tex., 603 Federal Office Bldg.

Jacksonville 1, Fla. 425 Federal Bldg.

Kansas City 6, Mo., 600 Interstate Bldg.

Little Rock 5, Ark., 312 Pyramid Bldg.

Los Angeles 12, Calif., 1540 U. S. Post Office and Courthouse.

Louisville 2, Ky., 631 Federal Bldg.

Manchester, N. H., Beacon Bldg.

Memphis 3, Tenn., 229 Federal Bldg.

Miami 32, Fla., 701 Congress Bldg.

Minneapolis 1, Minn., 1234 Metropolitan Life Bldg.

Mobile 5, Ala., City Hall Annex.

New Haven 10, Conn., 152 Temple St.

New Orleans 12, La., Masonic Temple Bldg.

New York 1, N. Y., Empire State Bldg., 350 Fifth Ave., 60th Floor.

Oklahoma City 2, Okla., 901-905 Petroleum Bldg.

Omaha 2, Nebr., 918 City National Bank Bldg.

Peoria 2, Ill., 531 First National Bank Bldg.

Philadelphia 3, Pa., 1612 Market St.

Phoenix 8, Ariz., 234 N. Central St.

Pittsburgh 19, Pa., 1013 New Federal Bldg.

Portland 3, Maine, 142 High St.

Portland 4, Oreg., 520 S. W. Morrison St.

Providence 3, R. I., 631 Industrial Trust Bldg.

Richmond 19, Va., 801 E. Broad St., Room 2, Mezzanine.

St. Louis 1, Mo., 107 New Federal Bldg.

Salt Lake City 1, Utah, 321 Atlas Bldg.

San Antonio 5, Tex., 101 Transit Tower Bldg.

San Diego 1, Calif., 906 Columbia St.

San Francisco 11, Calif., 307 Customhouse.

Savannah, Ga., Room 6, U. S. Courthouse and Post Office Bldg.

Seattle 4, Wash., 809 Federal Office Bldg.

Sioux Falls 6, S. Dak., 310 Policyholders National Bldg.

Syracuse 2, N. Y., 224 Harrison St.

Texarkana 5, Tex., 817 Texarkana Nat'l Bank Bldg.

Wichita 2, Kans., 205 K. F. H. Bldg.

Worcester 8, Mass., 340 Main St.

Digitized by Google

Domestic Commerce

written for

BUSINESSMEN . .

● Here is an authoritative monthly periodical written in the language of the American businessman. It is one of the principal organs of the Department of Commerce for disseminating information deemed of importance in maintaining a vigorous and dynamic free enterprise system.

● Domestic Commerce gives the reader an understanding of the progress and changing conditions of industry and business of the United States. Its writers are officials of this and other Government agencies, and specialists in the various subjects covered.

● Particular attention is given to developments in the field of post-war planning.

{ *A sample copy will be sent you upon request to the Bureau of Foreign and Domestic Commerce, Washington 25, D. C.* }

$1.00 per year . . . from the Superintendent of Documents

U. S. GOVERNMENT PRINTING OFFICE • WASHINGTON 25, D. C.

Digitized by Google

Documents Room
Foreign & Domestic Commerce

Industrial Reference Service

U. S. DEPARTMENT OF COMMERCE, HENRY A. WALLACE, *Secretary*
Office of International Trade, ARTHUR PAUL, *Director*

Part 1. TRANSPORTATION and PUBLIC UTILITIES

Available in Parts Covering Selected Services and Commodities
Annual Subscription $1.50. Price this report 5 cents
For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., or any of the Department's Field Offices

Volume 4—Part 1 August 1946 Number 14

D 15604
INDIANA UNIVERSITY
SEP 18 1946
LIBRARY

Highways of Uruguay

Based on reports of Foreign Service Officers, United States Embassy, Montevideo and other official reports.

By Edgel C. Skinner and Elisha E. Early, Transportation and Communications Division, Special Services and Intelligence Branch, Office of World Trade Promotion



Courtesy Pan American World, Photographic Service

View of the Central Plaza, Montevideo, base point from which most of Uruguay's main highways radiate to the various boundaries.

Digitized by Google

Highways of Uruguay

Outlook

Uruguay has an extensive network of well-constructed highways, particularly along the east coast where well-maintained, macadamized highways provide good motoring to the numerous beach resorts which have made Uruguay famous as a tourist center.

In 1944, Uruguay adopted a 5-year plan of public works which projects an expenditure of 40,000,000 pesos[1] for the construction and improvement of highways. The program projects a strategic network of trunk roads supplemented by improved feeder roads. It is probable that the new highways will be coordinated with the railways to prevent uneconomic duplication of transportation.

General Information

Although Uruguay, with an area (72,153 square miles) approximating that of North Dakota, is the smallest of the South American Republics, its location at the mouth of the Rio de la Plata gives it a greater importance than its territorial size would indicate. Bounded on the north and northeast by Brazil, on the west by Argentina, and on the south by the estuary of the Rio de la Plata, it is geographically a part of the Rio de la Plata plains in the east and south, and a southern extension of the Parana plateau of southern Brazil in the north and northwest. Thus most of its area is a rolling, grassy plain. This plain supports a population (estimated to be 2,202,936 in 1942) greater in density than that of any other country in South America.

The country's prosperity is based on livestock breeding. About three-fourths of the area is given over to grazing, and, in the period 1929-38, animals and animal products accounted for 80 percent or more of the value of exports, which are estimated to be about 25 percent of the national income. As indicated by the fact that wool alone accounted for 40 percent or more of the value of exports in the period 1932-36, sheep are more important to the national economy than cattle.

Agriculture, as compared with grazing, is relatively unimportant. Only 6 percent of the land and 5 percent of the population are employed in farming, and, in 1938, agricultural products accounted for only 10 percent of the exports.

Although the country's economy is primarily pastoral, industrial development has been of no small importance. Estimates place total industrial production in 1941 at 412,000,000 pesos (approximately $216 million). Foodstuff industries (including the packing plants) accounted for 41 percent of the total; public utilities, 30 percent; beverage and textile industries, 8.5 percent each; and leather industries, most of the remaining 12 percent. The last industrial census, that of 1936, showed industrial personnel numbering 105,313, which figure approximated the number engaged in agriculture. Most of the industrial workers, however, are employed in small plants.

Most of the large industrial plants are located in Montevideo, where about a third of the country's population live. However, Fray Bentos, on the Uruguay River, has some large meat-packing plants; and paper factories are at Mercedes, Puerto Sauce, and Canelones. With the realization of projected hydroelectric developments on the Rio Negro, the departments of Rio Negro and Soriano may become industrial regions: and deposits of silver, copper, lead, manganese, gold, and lignite found in the northern departments may be exploited.

[1] One peso is the equivalent of about 52.63 cents.

TABLE 1.—*Principal Highways*

Highway and sections	Approximate length (miles)	Notes on road conditions
Route No. 1, Montevideo-Colonia	110	Cement concrete.
Route No. 2, Mile 80 Route 1—Fray Bentos	113	Macadam and stone.
Route No. 3, Mile 42 Route 1—Bella Union	347	Macadam, gravel, and stone. Two sections about 2 and 6 miles in length to be constructed.
Route No. 4, Durazon-Artigas	242	Except for the first 15 miles, the road is projected.
Route No. 5, Montevideo-Rivera	323	First 35 miles concrete; remainder stone and macadam, except for section between Mile 271 and Mile 295 to be constructed.
Route No. 6, Montevideo-Paso Real de San Luis	255	Macadam, gravel, and stone. Under study between Mile 85 and Mile 255.
Route No. 7, Mile 17, Route No. 6—Centurion (Brazilian border)	253	Macadam, gravel, and stone, except for stretch of natural earth between Mile 130 and Mile 209. To be constructed between Mile 255 and Mile 270. Between Mile 90 and Mile 130, 7 miles to be constructed.
Route No. 8, Montevideo-Marco de Acegna	283	Two stretches, 19 and 2 miles in length, concrete; remainder, macadam and stone. To be constructed between Mile 95 to Mile 108, but detour is made via Routes 13 and 39.
Route No. 9, Mile 39, Route No. 8—Chuy.	170	Macadam, stone, and gravel.

Highway System

As a result of the fact that the economic life of the country centers in Montevideo, transportation facilities—which are more completely developed than those of any other South American country—converge upon this city. From it, both railroads and national roads fan out west and northwest to the Rio de la Plata estuary and Rio Uruguay, east to the Atlantic coast, and north and northeast to the Brazilian border. While the Rio de la Plata estuary and Rio Uruguay give the country about 700 miles of continuous coastal and river navigation, most of the ocean traffic passes through Montevideo. Other cities of the country are focal points for their immediate hinterland and function as local collection and distribution centers.

Planning and Financing

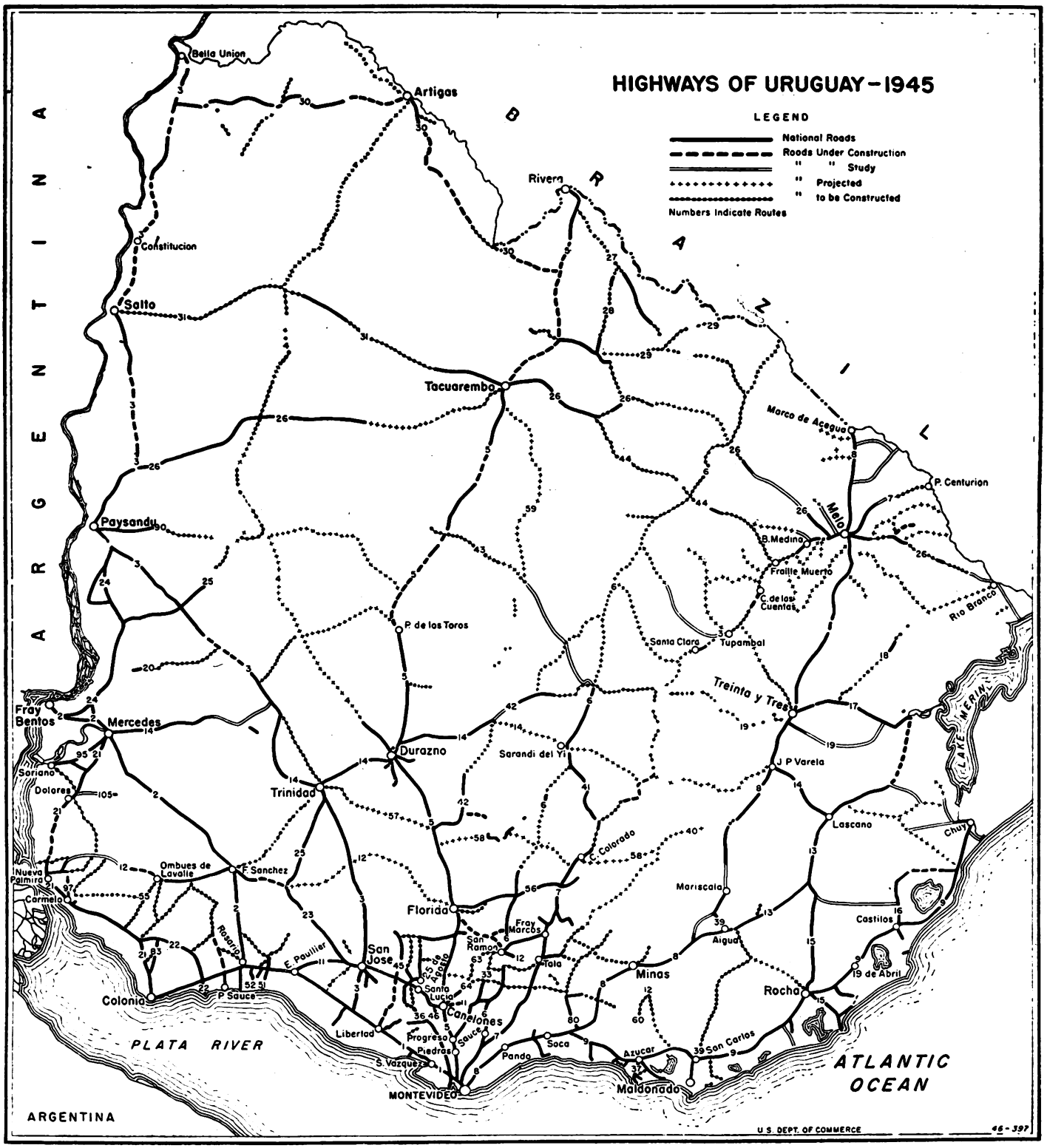
All planning and the final disposition of funds previously allocated by the Treasurer of the Nation are under the authority of the Highway Office (Direccion de Vialidad), which is a dependency of the Ministry of Public Works (Ministerio de Obras Publicas).

The highway system is comprised of national and departmental roads. Roads of the national system fan out from Montevideo while department roads serve as feeders to the national roads, which in many instances are in turn feeders to the railways. Table 1 shows the length and surface of the more important of the national roads. Routes 1 and 8 constitute Uruguay's section of the Pan American Highway.

Importance of Pan American Highway

When completed the Pan American Highway will be an important link to the national highway system of Uruguay, as it will provide a through route for international traffic between Argentina and Brazil. Domestically, the Pan American Highway contains in the portion designated as route 1 the most heavily traveled highway in the country; the newer part which is under construction (route No. 8) should open up areas in the northeast region of the country which heretofore have been

Digitized by Google



dependent upon more expensive rail transport to get their products to and from Montevideo.

Mileage and Surface Classifications

At the end of 1944, the national highway system totaled 3,050 miles. It has been estimated that departmental roads —all of unimproved earth surface— total 22,000 miles. If the departmental roads are included, there was, in 1944. 1 mile of road per 2.9 square miles of territory. As measured by ranking this figure with the comparable figure for each of the other 20 American Republics, Uruguay was second in highway development only to the United States.

Surfaced roads in Uruguay totaled 2,667 miles or 11.1 percent of all road mileage in 1944. As may be noted from the following tabulation, about 22 percent of the surfaced roads were paved.

Construction type	Miles	Percent of total
Unimproved earth and nonsurfaced National, departmental, 383; 22,000	22,383	89.4
Sand clay, gravel, waterbound macadam	2,081	8.3
Surface treated macadam, asphalt, cement concrete, paving stone	586	2.3
Total	25,050	100.0

Digitized by Google

Highway Transport

As a result of the through improved highways, truck and bus services of all kinds have become an important part of the transportation system of the country. Although railroads reach all departmental capitals, freight and passenger services beyond railheads are dependent on trucks and busses. The motor-carrier industry of Uruguay now represents an important capital investment.

Passenger transportation—An extensive system of interurban passenger bus lines, whose services will be improved and expanded when equipment is available. has developed. In 1945, there were 23 interurban bus cooperatives operating 761 vehicles from Montevideo. Table 2 is a partial list of the routes of the various organizations. In addition to the lines operating from the capital, a number of lines operate in the interior as feeders to the railways.

Urban bus transport.—Montevideo is the only city with urban bus service. This service is operated by the Cooperative Uruguaya de Transportes Colectivos S.A., which, in 1945, operated 573 busses over 63 routes. In 1944, this bus system carried 194,274,000 passengers

Freight transportation.—Few trucking organizations serve common carriers. Most trucks are either owner-driver operated or owned by companies using them in connection with the operation of another type of business. It is quite possible, however, that the owner-drivers within the next few years may become organized into cooperative associations such as the bus cooperatives. With such organization, it is probable that tariffs, routes, and schedules will be standardized.

Although trucking companies, with large fleets of trucks and established routes and schedules, do not exist, the volume of freight handled on the highways is important, as indicated by the fact that incoming and outgoing trucks registered by months in Montevideo at highway control scales totaled 154,400, with a gross weight of 1,235,300 metric tons, in 1944. It has been estimated that about 50 percent of this traffic consists of foodstuffs for the Montevideo market, which is supplied for the most part by farms within a range of 22 and 31 miles. Although most of the larger truck farms operate trucks, individual owner-drivers often contract with smaller farms for daily delivery of produce.

About 20 percent of the highway freight traffic into Montevideo consists of firewood, which for the most part is obtained from artificial plantations of eucalyptus trees. A small group of contractors purchase stands of the trees which are cut, prepared, and hauled to market in their own fleet of trucks.

TABLE 2.—*Bus Cooperatives Operating from Montevideo*

Organization	Terminal point	Approximate length of route (miles)
Organizacion Nacional de Autobuses	Salto	373
	Melo	262
	Artigas	559
	Tacuarembo	267
	Colonia	112
	Rio Grande	367
	Porto Alegre (occasional service)	
Flecha de Oro	Carmelo	158
	Nueva Helvecia	76
	Colonia	112
	Ombues de Lavalle	154
Cooperativa Minas-Treinta y Tres	Minas	78
	Aigua	108
	Lazcano	161
	Mariscala	121
Pando y Derivados	Parque del Plata	36
	Floresta	40
	Pando	22
Cooperativa del Norte	Santa Lucia	40
	25 de Agosta	41
Cooperativa Tala-Fray Marcos	Cerro Colorado	95
Union Transportes del Uruguay	Fray Marcos	57
Cooperativa Cuidad de Dolores	Dolores	186
Cooperativa Canelones Santa Lucia	Santa Lucia	40
Empresa La Tuna	Pueblo Soca	35
Cooperativa Las Piedras	Las Piedras	12
Empresa Florida	Florida	68
Empresa Casanovas	Canelones	27
	Sauce	22

Motor-vehicle registrations.—As of January 1, 1946, motor-vehicle registrations were estimated to be 31,500. Of this number 21,200 were for passenger cars while the remaining 10,300 were for trucks. On January 1, 1941, the total registrations were shown as 45,765. This total is broken down as follows: Passenger cars, 33,500, busses, 510. trucks, 11,000, and Diesel units, 755. The difference between the 1946 and the 1941 figure is due to the shortage of parts, tires, and gasoline.

Highway Construction Plans

Late in 1945, a bill providing for a 5-year public works program became law. Like most public works plans for the postwar period, its purpose is employment cushioning while the economy adjusts to peacetime conditions, as well as economic development of the country. Of the 70,000,000 pesos appropriated, 40,000,000 pesos are set aside for highway purposes as follows:

	Pesos
Works to be executed	28,060,400
Gradual transformation from macadam to concrete highways or bituminous layer at the rate of 2,000,000 pesos per year	10,000,000
Total	38,060,400
Possible depreciation of bonds, expenses, and commissions (5%)	1,903,020
Total	39,963,420

The total nominal value of the bond issue for the highway program however, is to be 40,000,000 pesos, to be spent at the rate of 8.000.000 pesos a year for 5 years. Construction totaling about 1,550 miles of new roads is planned under the program.

In the 1939-43 period the average yearly expenditure for highways was 6,029,600 pesos. The following tabulation shows the expenditures by years:

Highway Expenditures, 1939-43

[In pesos]

Year	Special laws	Annual budget	Total
1939	4,358,370	2,247,699	6,606,069
1940	3,547,847	1,482,556	5,030,403
1941	2,799,624	2,180,592	4,980,216
1942	3,931,397	2,356,677	6,288,074
1943	5,197,368	2,045,872	7,243,240
Total	19,834,606	10,313,396	30,148,002

☆U. S. GOVERNMENT PRINTING OFFICE: 1946—707793—4

Digitized by Google

cuments Room

Industrial Reference Service

U. S. DEPARTMENT OF COMMERCE, HENRY A. WALLACE, *Secretary*

Office of International Trade, ARTHUR PAUL, *Director*

INDIANA UNIVERSITY 1 9 4946

Part 1. TRANSPORTATION and PUBLIC UTILITIES

Available in Parts Covering Selected Services and Commodities
Annual Subscription $1.50. Price this report 5 cents
For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., or any of the Department's Field Offices

Volume 4—Part 1 August 1946 Number 15

D 16348

Railways of Bolivia

Prepared by Seymour T. R. Abt, Transportation and Communications Division, Special Services and Intelligence Branch

Based on reports of Foreign Service Officers, United States Embassy, La Paz, Bolivia and other official sources

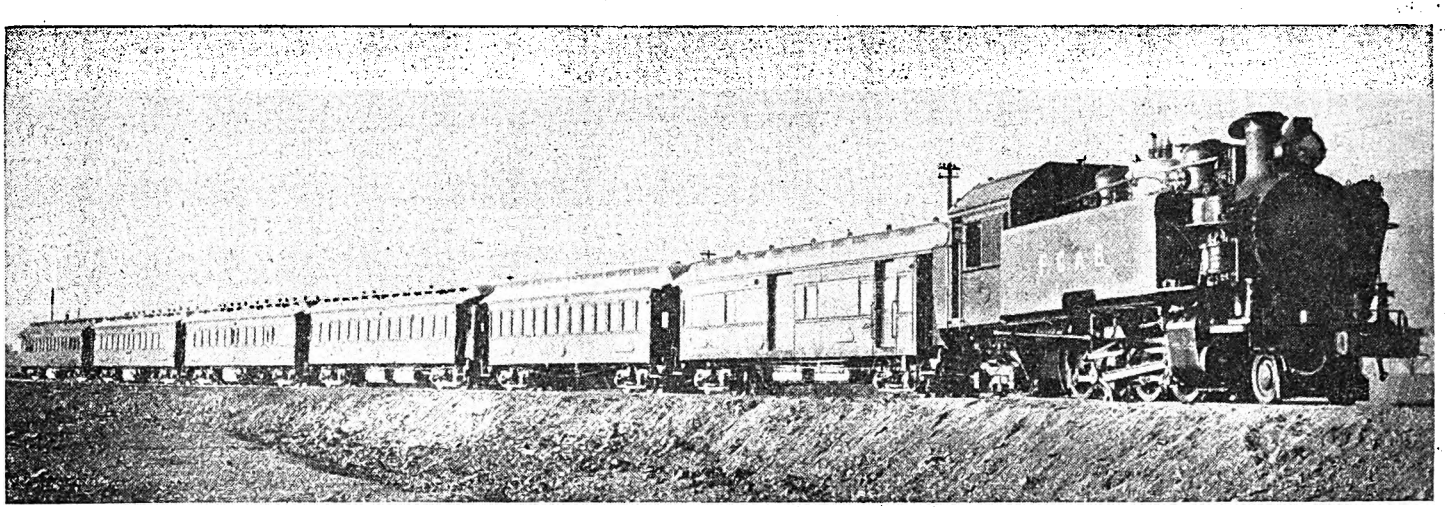
The Republic of Bolivia is a land-locked country with an estimated area of 419,470 square miles. Its population is approximately 3,460,000, of which about 55 percent is composed of Indians, chiefly of the Aymara and Quechua tribes.

The country has three distinct topographical and climatic divisions. The first of these is the high plateau region of the west, averaging 12.000 feet above sea level, but having some peaks that reach elevations of 20,000 feet and more. This district, separated by mountains from Chile and Peru on the west and from the Bolivian plains on the east, comprises two-fifths of the total area of the country. It is the center of the nations population and of its mining industry and political activity. The climate here is temperate to cold, 35 degrees Fahrenheit being the average temperature. The second division, known as the Yungas, is made up of the valleys sloping toward the eastern plains. Although 5,000 to 11,000 feet above sea level, the Yungas has a subtropical climate. A large percentage of this area is heavily forested, while parts of it are important agriculturally. The third division includes the tropical pampa and swampland of the Beni and the Chaco to the south. Here are found rubber, petroleum deposits, grazing land, and the valuable forest products, cinchona bark and quebracho. Both of the last two divisions are sparsely inhabited, chiefly by Indian tribes, and many sections are unexplored and inadequately provided with transportation facilities.

Economy

The Republic of Bolivia has long been famous for its production of tin, in which it has been a world leader. During the war, Bolivian tin was a vital contribution to the allied war machine. Postwar conditions, however, have reduced the demand for Bolivian tin and other metals, and the Government has been directing its efforts toward the stimulation of agriculture, manufacturing, and the petroleum industry.

Notwithstanding the trend toward the development of other industries, mining still furnishes the life-blood of Bolivia. The total of all exports in



The international train between Antofagasta and La Paz (courtesy Antofagasta (Chili) & Bolivia Railway Co., Ltd.)

Digitized by Google

1945 amounted to approximately $79,280,000, of which minerals comprised $73,860,000. Government measures to encourage agriculture have taken the form of irrigation projects, a request to the United States Department of the Interior for an expert on fish breeding and culture, a program of education in agriculture, and the assignment of additional funds to the Bolivian Development Corporation which is active in several agricultural projects. The Banco Agricola is also assisting by granting loans to farmers. In the manufacturing field, several large installations were established in 1945. Manufacturing, however, is still on a small scale. In 1941, the latest year for which figures are available, total production was valued at about $16,600,000. The petroleum industry, which produced no oil before 1925, turned out 381,554 barrels of crude petroleum in 1945.

Transportation

Bolivia has about 600 miles of all-weather highway surfaced with improved earth or rock-and-gravel, 8,300 miles of dry-weather nonsurfaced roads, and 1,160 miles under construction. The country is connected with the Paraguay River (navigable for 1,050 miles) at Puerto Suarez. Other navigable rivers include the Itenez, 1.000 miles, and the Beni, 1,000 miles for steamers of six-foot draft. Several other rivers which can accommodate shallow-draft vessels only flow into the Amazon or Paraguay Rivers. Air service is provided by Lloyd Aereo Bolivian internally and Pan American-Grace Airways internationally. More than 30 airports and landing fields are located in the principal cities and at points of connection with the isolated regions.

Free port privileges have been granted Bolivia at Santos, Brazil.

Storage facilities for general cargo exist at Arica, Villazon, Mollendo, and Antofagasta as well as at the principal Bolivian cities. They are in general inadequate to meet demands.

Bolivian Railways

Railroad communication in Bolivia is almost exclusively the result of two characteristics—the country's tin resources and its lack of a seaport. There are nine distinct railway entities in Bolivia. Of these, the Arica-La Paz, the Antofagasta-Bolivia, and the Guaqui-La Paz Railways serve as contacts with Pacific ports, and the Cochabamba-Santa Cruz is a partially completed link in what will be a transcontinental railway from Santos, Brazil, to Arica, Chile. A fifth road, the Atocha-Villazon, connects with Argentina at one terminus and with the Antofagasta-Bolivia at the other, thus in fact being part of a trans-continental route. The Machacamarca-Uncia and Huanchaca Railways are mining roads. The Potosi-Sucre is an appendage of the Bolivia Railway, which in turn is part of the Antofagasta-Bolivia. Even the ninth road, the La Paz-Yungas, was at one time intended to connect with Brazil's Madeira-Mamore Railway and thus give access to the Amazon River.

Construction

Construction under way and proposed is designed to further development of Bolivian agricultural and petroleum resources as well as to provide better access to the sea. The eastern regions of Bolivia are capable of producing large quantities of foodstuffs and oil, but hitherto their exploitation has been slow largely because of the lack of transportation facilities. The new lines, when completed, are expected to provide the main transportation element needed. Santa Cruz will then be a rail center of considerable importance—centrally located in a potentially rich country and providing access to Brazilian, Chilean, and Argentinian ports, as well as to western Bolivia.

Bolivia's outstanding railway project is the construction of the line from Corumba on the Brazilian border to Santa Cruz and from there to Cochabamba. This line will be the last link in the Santos-Arica transcontinental road. Construction has been started from both Corumba and Cochabamba. From the east the railhead is already advanced to Robore, and completion of the line to San Jose is expected this year. From Cochabamba the railway extends to Vila Vila, and construction is under way to Mizque, as well as having been started east of there. Difficult terrain complicates closing of the gap.

Another construction project of importance is the railway from Yacuiba, on the Argentine border, to Santa Cruz. The work is being done by Argentina and has proceeded from Yacuiba to Villa Montes. This road is destined eventually to meet another line from Sucre at Boyuibe. Construction on the latter project is completed to Tarabuco and is in progress from Tarabuco to Zudanez. A spur is planned from this line to Camiri.

The Yungas Railway, whose construction has been one of the most difficult in railroad history, is planning extension of its line to Coroico, and a considerable part of the roadbed is laid. The territory to be served is the principal supplier of vegetables and fruits to La Paz and the constructed roadbed is now used as a highway. Difficult topography and a lack of funds have hampered progress on the railway. The road may be electrified finally, with power supplied by a proposed hydroelectric plant at a waterfall near La Paz.

A construction project now under way in Peru will be of great importance to Bolivia when completed. This is the railroad from La Joya to Matarani, a port closed in by breakwaters (Mollendo is an open port) and with excellent facilities including concrete warehouses and an enclosed compound. Tariffs, incidentally, from Mollendo to La Paz by the Peruvian Southern Railway, Lake Titicaca, and the Guaqui-La Paz Railway, 802 km., are the same as those from Arica to La Paz, 457 km.

Highway Competition

There is no organized highway transport traffic in Bolivia, and statistics from individual operators are not available.

Permanent Way

Traffic interruptions in the past have been frequent on Bolivian railways, because of landslides and washouts occasioned by the topography and climate. However, a program, initiated in 1943, to improve roadbeds and drainage methods and to educate personnel to exercise a higher degree of vigilance, is showing remarkable results. In 1945 there was only one interruption, the result of a washout on the very exposed Oruro-Cochabamba line. In this connection it should be noted that the rainy season annually disrupts traffic on the Argentina railroad which connects with the Atocha-Villazon line.

Equipment and Facilities for Maintenance

The condition of the rolling stock and motive power of Bolivian railways varies from good to poor. The scarcity of materials and machinery and the dislocated foreign trade of the war years have had their effect on the railroads. In general, there is need for both equipment and parts today, and there is no domestic production of railway equipment in Bolivia.

F. C. Arica-La Paz: Equipment is in fair shape, but insufficient to meet demands. Locomotives have hitherto burned coal exclusively (from Chile and the United States). A new fuel, however, has been developed and will be manufactured locally.

Locomotives: 2 passenger and mixed, 6 freight; passenger cars: 9, average capacity 42, weight 19 tons; baggage cars: 1, capacity 15 tons, weight 21 tons; freight cars: 121 box, 5 gondola or ore, 56 flat, 8 tank (capacity 5,000 gallons each), 14 miscellaneous (no refrigerator). Average for all freight cars: capacity 30 tons weight 12 tons; couplers: automatic; Brakes·

Digitized by Google

TABLE I.—*Bolivian Railways (Common Carrier)*

Railway	Ownership	Address (Bolivia unless otherwise specified)		Length (Kilometers)	Under Construction or Proposed [1]
		Home	Local		
F. C. Arica-La Paz (Bolivian Section)	Bolivian Government	La Paz	La Paz	El Alto (La Paz)-Charana—241	None
F. C. La Paz-Yungas	Bolivian Government	La Paz	La Paz	La Paz-Ing. Tejada—54	Ing. Tejada-Coroico proposed
F. C. Atocha-Villazon	Bolivian Government	Tupiza	Tupiza	Atocha-Villazon—198	None
F. C. Cochabamba-Santa Cruz	Bolivian Government	Cochabamba	Cochabamba	Cochabamba-Vila Vila—128 Cliza-Arani—20	Vila Vila-Mizque under constr. (about 80% completed) (Proposed line will reach Santa Cruz)
F. C. Potosi-Sucre	Bolivian Government	Sucre	Sucre	Potosi-Sucre—175 Sucre-Tarabuco—78	Tarabuco-Zudanez (61 km.) under constr. (Zudanez-Boyuibe proposed) [2]
F. C. Corumba-Santa Cruz	Bolivian Government	Corumba, Brazil	La Paz	Corumba-Robore—259	Robore-San Jose under constr; San Jose-Santa Cruz proposed
Antofagasta (Chili)—Bolivia Railway Co., Ltd. (Bolivian Section—has leased properties of Bolivian Railway Co., Ltd.)	Private British	London, England	La Paz	Viacha-La Paz—41 Ollague-Oruro—486	None
Bolivia Railway Co., Ltd.	27 percent Bolivian Govt. 73 percent Antofagasta (Chili)-Bolivia Railway Co., Ltd.	30 Liberty St., NYC, N. Y.	La Paz	Oruro-Viacha—202 Oruro-Cochabamba—205 Rio Mulato-Potosi—174 Uyuni-Atocha—90	None
F. C. Guaqui-La Paz	British (subsidiary of Peruvian Corp. of Lima & London)	La Paz	La Paz	Guaqui-La Paz—98 (9 km. electrified)	None
F. C. Machacamarca-Uncia	American Corp. (Patino Mines & Enterprises, Consolidated, Inc.)	Machacamarca	Machacamarca	Machacamarca-Uncia—108	None
F. C. Huanchaca de Bolivia	Cia. Huanchaca de Bolivia	Not Available	Not Available	Uyuni-Huanchaca—39 (gage 0.76 meter)	Not Available
				Total 2,596	

[1] Yacuiba-Villa Montes under construction; Villa Montes-Santa Cruz proposed; Sucre-Uncia proposed; Zudanez-Aiquile (proposed site of oil refinery) proposed.

[2] A spur is planned to Camiri. The entire Tarabuco-Boyuibe construction is to be financed by Argentina.

Note: All lines are single track, meter (3 feet 3⅜ inch) gage, and steam unless otherwise specified.

TABLE II.—*Permanent Way—Bolivian Railways*

Railway	Curvature (metric radius)	Grade (percent)	Ties	Tunnels (meters)	Bridges (meters)	Rails (lbs.)
F. C. Arica-La Paz	100	2.2	Wood	0	674	75
F. C. La Paz-Yungas	60	6	Wood	119	194	36 and 50
F. C. Atocha-Villazon	82.06	3	Wood, some steel	475	2,032	65 and 75
F. C. Cochabamba-Santa Cruz	74.96	3	Wood	1,327	815.60	65
F. C. Potosi-Sucre	70	3	Wood	130	568	60 and 65
F. C. Corumba-Santa Cruz	3°48′	1	Wood	0	not available	65
F. C. Antofagasta-Bolivia	76.61	3	Wood and steel, abt. 50 percent each	0	Viacha-La Paz—174 Ollague-Oruro—3,294	60, 65, 75
Bolivia Railway Co., Ltd.	76.61	3	Wood and steel, abt. 50 percent each	Oruro-Cochabamba 315	Oruro-Viacha—863 Oruro-Cochabamba—3,287 Rio Mulato-Potosi—268	60, 65, 75
F. C. Guaqui-La Paz	100	7 El Alto-La Paz (9 km.) Balance 2	Wood	0	310	75
F. C. Machacamarca-Uncia	71.85	2.5	Wood and steel	90	245.30	75

Note: Ballast on all roads is dirt and crushed rock.

automatic and hand; roundhouses: Charana, Viacha; Shops: machine shop for general locomotive repairs at Viacha. Running repairs may be made at various stations.

F. C. La Paz-Yungas: Equipment old. Locomotives burn coal (from the United States) or wood (local).

Locomotives: 2 freight, no passenger; passenger cars: none; baggage cars: none; rail cars: 7, average capacity 20 passengers; freight cars: 5 box (80 ton), 8 gondola (20 ton), 4 flat (20 ton), all in use since 1918. Flat cars steel frame, others wooden bodies; couplers: automatic; brakes: automatic and hand; roundhouses: Pura Pura (La Paz); Shops: Pura Pura (La Paz) (minor repairs—major repairs made at Viacha shop of Arica-La Paz); classification yards: none.

F. C . Atocha-Villazon: Four Baldwin Santa Fe locomotives delivered in 1943 are in excellent condition. The others are mostly in poor condition.

Digitized by Google

The latest report on the condition of rolling stock (1941) indicated that it is serviceable. Of the locomotives 8 are coal burners, but use mostly wood (local) and Yareta (a native fuel), and 5 are oil burners (local).

Locomotives: 13 passenger and mixed, no freight; passenger cars: 12, average capacity 30, weight 22 tons. (In 1941, of 12 cars reported, 2 were diners and 3 were sleeping cars. One sleeping car had been built in 1937, one other car had been built in 1928. The others had been built in 1926.); baggage cars: 2, average cap. 20 tons, weight 23 tons (one purchased in 1925 and one rebuilt in 1931); freight cars: 25 box, 5 gondolas (purchased 1925), 11 flat (purchased 1922), 26 tank (capacity 5,000 gallons each), 26 miscellaneous (no refrigerator). Average for all freight cars: capacity 25 tons, weight 12 tons; couplers: automatic; brakes: automatic, direct, and hand; roundhouses: Atocha, Tupiza, Villazon; shops: Tupiza, equipment poor, mostly worn out German machines; classification yards: none.

F. C. Cochabamba-Santa Cruz: Equipment is old, obsolete, and in poor condition. Locomotives burn coal (from the United States) and wood (local).

Locomotives: 6 passenger and mixed, no freight; passenger cars: 20, average capacity 46, weight 18 tons; baggage cars: 2, average capacity 18 tons, weight 16 tons; Motor Rail cars: 16; freight cars: 25 box, 3 gondolas, 27 flat, 2 miscellaneous (no refrigerator or tank); couplers: pin and link, few automatic; brakes: hand and some Westinghouse; roundhouses: Cochabamba; shops: Cochabamba, poorly equipped but doing good job keeping rolling stock and motive power serviceable. Shops dependent upon imports for all materials; classification yards: none.

F. C. Potosi-Sucre: Equipment is old, obsolete, and in poor condition. One locomotive burns oil (local), other two wood and yareta (local) and coal (from the United States). One additional locomotive, an oil burner in fair shape, is rented from Atocha-Villazon line.

Locomotives: 3 freight, no passenger or mixed; passenger cars: 2; baggage cars: none; Motor Rail cars: 16; freight cars; 6 box, 3 gondolas, 6 flat, 7 miscellaneous (no refrigerator or tank); passenger and freight rolling stock fairly well cared for, but in poor shape because worn out and beyond repair; couplers and brakes: no uniform system employed; roundhouses: Sucre; power plants: Sucre (small Diesel); shops: Sucre, equipped for all work, including general locomotive repairs. A 1941 survey called this the best machine shop of the Bolivian railways. Materials for repairs must all be imported; classification yards: none.

TABLE III.—*Bolivian Railways, Freight Traffic (Metric Tons), 1938-44*

Railway	1938	1943	1944	Chief Products (1944)
Arica-La Paz	157,804	133,381	123,840	Wood and other fuel
La Paz-Yungas	5,544	6,367	6,486	Wood and other fuel
Atocha-Villazon	48,012	165,398	143,933	Cereals, etc., cattle
Cochabamba-Santa Cruz	28,529	40,275	37,583	Cereals, etc.
Potosi-Sucre	24,273	25,063	23,399	Wild wood, cement
Corumba-Santa Cruz				
Antofagasta-Bolivia	402,012	616,724	545,687	Minerals
Bolivian Railway Co.	302,289	606,754	569,712	Mining and construction materials
Guaqui-La Paz	119,050	93,777	122,820	Sugar
Machacamarca-Uncia	52,440	96,542	88,799	Tin
Total	1,139,953	1,784,281	1,662,259	

F. C. Corumba - Santa Cruz: Equipment is mostly old, but in fair condition and well maintained. Locomotives all burn wood (local).

Locomotives: 12 passenger and mixed, no freight; passenger cars; 2 (business); baggage cars: none; motor rail cars: 6; freight cars: 60 box, 81 gondola or ore, 82 flat, no others; couplers: automatic and pin and link; brakes: automatic air and hand; roundhouses: Corumba (Brazil); shops: Ladario, Corumba (Brazil) fairly well equipped. Ladario shops build some equipment, but on a small and experimental scale; classification yards: none.

F. C. Antofagasta-Bolivia: Equipment is in fair shape. Four locomotives burn coal (normally from Great Britain, but during the war from the United States). Others burn oil (from Peru).

Locomotives: 13 passenger and mixed, 7 freight (14 additional rented from Chilean section); passenger cars: 21, including 7 sleeping cars, plus 11 rented from Chilean section. Average capacity 40, weight 20 tons; baggage cars: 3 plus one rented from Chilean section; Motor Rail cars: 4; freight cars: 86 box plus 90 rented from Chilean section, 14 gondola or ore plus 61 rented from Chilean section, 88 flat plus 30 rented from Chilean section, one water tank, 9 oil tanks, 2 miscellaneous plus 16 rented from Chilean section (no refrigerators); average for all freight cars: capacity 25 tons, weight 9.3 tons; couplers: automatic; brakes: Westinghouse air; roundhouses: La Paz, Oruro, Uyuni; Shops: La Paz, Oruro, Uyuni, large, well equipped, do repairs and general overhauling, but do not build new equipment. Depend upon imports for all materials; power plants: Uyuni (3 semi-Diesel); classification yards: none.

Bolivia Railway Company, Ltd.: Equipment is in fair shape. Locomotives burn oil (from Peru), seven burn coal (normally from Great Britain, but during the war from the United States).

Locomotives: 6 passenger and mixed, 12 freight; passenger cars: 48 plus 8 rented from Chilean section; baggage cars: 6 plus 1 rented from Chilean section; average: capacity 40, weight 20 tons; freight cars: 89 box, 26 gondola or ore, 200 flat, 9 oil tanks, 1 water tank, 46 miscellaneous (no refrigerator). Average for all freight cars: capacity 25 tons, weight 93 tons; roundhouses: Rio Mulato (2 stalls), Potosi (4 stalls), Cochabamba (4 stalls), Viacha (2 stalls), Buen Retiro (2 stalls); shops: La Paz, Oruro, Uyuni, do repairs and general overhauling, but do not build new equipment. Depend upon imports for all materials; power plants: Uyuni (3 semi-Diesel); classification yards: none.

F. C. Guaqui-La Paz: No information is available on the condition of equipment. Steam locomotives burn oil. Electric locomotives get power from Bolivian Light and Power Co. The railroad has its own power plant, but it is kept only as a stand-by.

Locomotives: Steam: 5 freight, no passenger or mixed; Diesel: one freight, no passenger; electric: 6 freight, no passenger; passenger cars: 13; baggage cars: 2; motor rail cars: 2; freight cars: 62 box, 7 gondola or ore, 27 flat (of which 6 imported since 1943), 3 tank, no others; couplers: automatic; brakes: Westinghouse air, automatic, and hand; roundhouses: Pura Pura (La Paz), shops: Pura Pura (La Paz), small but well equipped for minor repairs only. All materials are imported; power plant: Villa Victoria (La Paz); classification yards: none.

F. C. Machacamarca-Uncia: Equipment is in good shape. Steam locomotives burn coal (from the United States) and wood (local). Gasoline is imported from Peru.

TABLE IV.—*Bolivian Railways, Passenger Traffic, 1938-44*

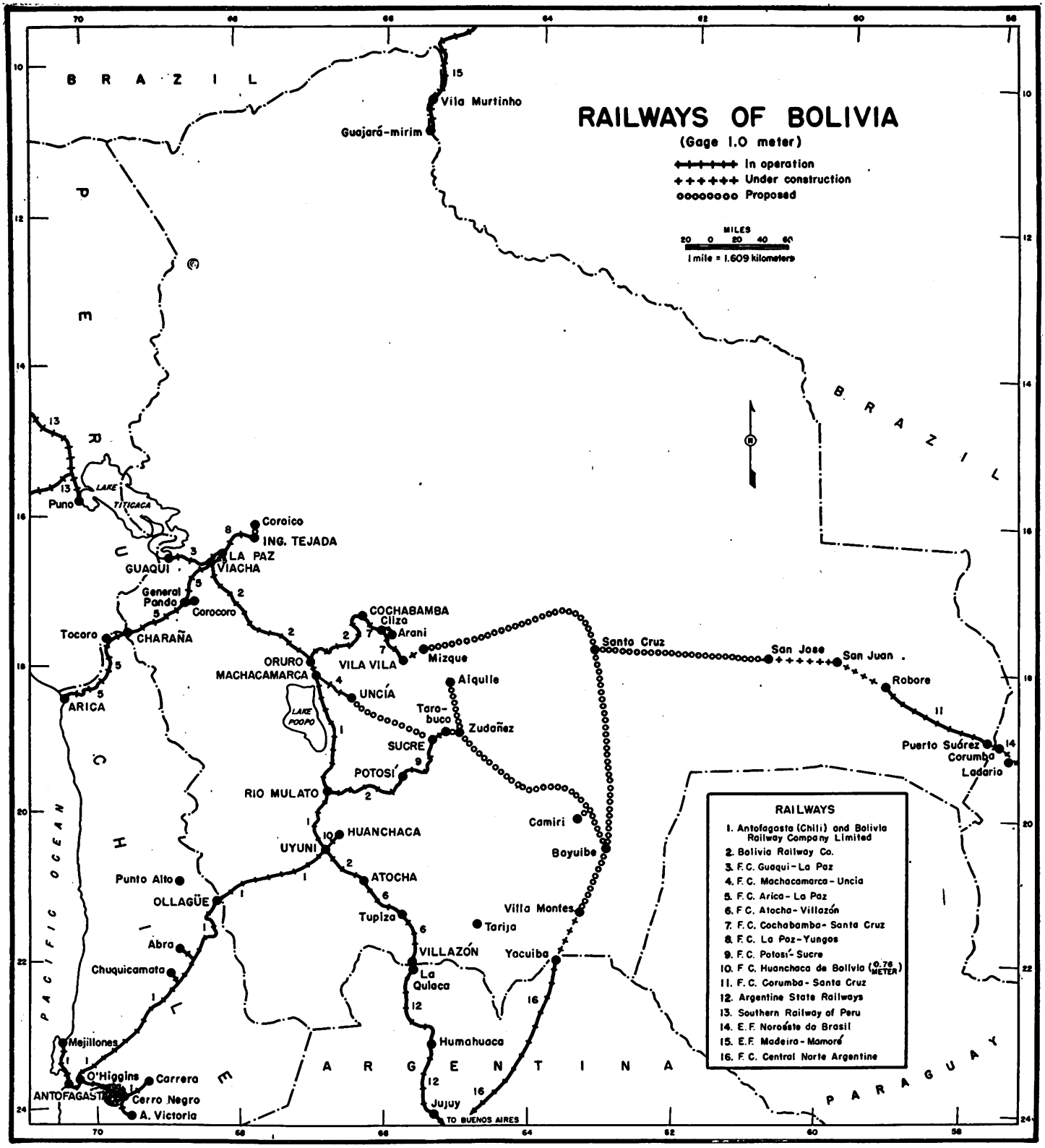
Railway	1938	1943	1944
Arica-La Paz	35,096	73,344	85,624
La Paz-Yungas	9,840	12,973	12,115
Atocha-Villazon	44,275	71,706	75,586
Cochabamba-Santa Cruz	375,037	665,335	720,816
Potosi-Sucre	53,807	35,572	37,813
Corumba-Santa Cruz			
Antofagasta-Bolivia	289,988	433,559	427,740
Bolivian Railway Co.	332,403	592,865	537,175
Guaqui-La Paz	47,408	65,216	75,088
Machacamarca-Uncia	57,662	102,825	119,511
Total	1,245,516	2,053,395	2,091,468

Digitized by Google

Locomotives: Steam: 7 freight, no passenger or mixed; Diesel: 2 passenger, no freight; passenger cars: 16; baggage cars: 4; motor rail cars: 2; freight cars: 42 box, 32 flat, 2 tanks (capacity 5,000 gallons each), 12 miscellaneous (no gondola, ore, or refrigerator); couplers: automatic; brakes: automatic and hand; roundhouses: Machacamarca; shops: Machacamarca, modern, well equipped, do all classes of repair work, including general locomotive repairs; power plant: Machacamarca; classification yards: none.

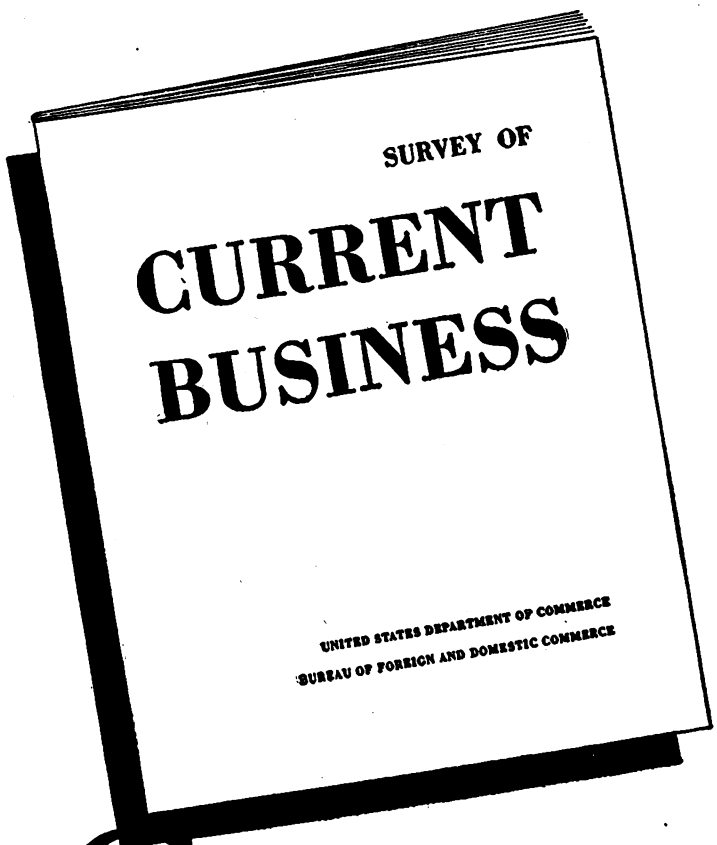
Traffic on Bolivian Railways

Tables III and IV are designed to indicate the nature and volume of business done by the several Bolivian railways. Data are presented for the last complete prewar year, 1938, as indicative of more-or-less normal conditions, and for 1943 and 1944 which are the latest years for which figures are available.



☆U. S. GOVERNMENT PRINTING OFFICE: 1946—707793—20

Digitized by Google



$2.00
per year

SURVEY OF CURRENT BUSINESS

THIS AUTHORITATIVE MONTHLY PERIODICAL makes easily available to businessmen over 2,200 comprehensive facts about production, stocks, orders, prices, sales, shipments, etc., of the industries of the United States by means of text, tables, charts, and index numbers.

A sample copy will be sent, on request to the
Bureau of Foreign and Domestic Commerce,
Washington, D. C.

$2.00 per year, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Digitized by Google

Department of Commerce
Field Service

Albany 7, N. Y., Room 409, County Courthouse.

Atlanta 3, Ga., P. O. Box 1595.

Baltimore 1, Md., 803 Cathedral St.

Boston 9, Mass., 1800 Customhouse.

Buffalo 3, N. Y., 242 Federal Bldg.

Charleston 3, S. C., 310 Peoples Bldg.

Charleston 1, W. Va., 612 Atlas Bldg.

Chattanooga 2, Tenn., 924 James Bldg.

Chicago 4, Ill., 357 U. S. Courthouse.

Cincinnati 2, Ohio, 1204 Chamber of Commerce Bldg.

Cleveland 14, Ohio, 1286 Union Commerce Bldg.

Columbus 1, Ohio, 1037 N. High St.

Dallas 2, Tex., 602 Santa Fe Bldg.

Denver 2, Colo., 302 Midland Savings Bldg.

Des Moines 9, Iowa, 518 Grand Ave., Room 300.

Detroit 26, Mich., 1028 New Federal Bldg.

Duluth 5, Minn., 310 Christie Bldg.

El Paso 7, Tex., Chamber of Commerce Bldg.

Fargo, N. Dak., 207 Walker Bldg.

Grand Rapids 2, Mich., 736 Keeler Bldg.

Hartford 6, Conn., 436 Capitol Ave.

Houston 14, Tex., 603 Federal Office Bldg.

Jacksonville 1, Fla. 425 Federal Bldg.

Kansas City 6, Mo., 600 Interstate Bldg.

Little Rock 5, Ark., 312 Pyramid Bldg.

Los Angeles 12, Calif., 1540 U. S. Post Office and Courthouse.

Louisville 2, Ky., 631 Federal Bldg.

Manchester, N. H., Beacon Bldg.

Memphis 3, Tenn., 229 Federal Bldg.

Miami 32, Fla., 701 Congress Bldg.

Minneapolis 1, Minn., 1234 Metropolitan Life Bldg.

Mobile 5, Ala., City Hall Annex.

New Haven 10, Conn., 152 Temple St.

New Orleans 12, La., Masonic Temple Bldg.

New York 1, N. Y., Empire State Bldg., 350 Fifth Ave., 60th Floor.

Oklahoma City 2, Okla., 901-905 Petroleum Bldg.

Omaha 2, Nebr., 918 City National Bank Bldg.

Peoria 2, Ill., 531 First National Bank Bldg.

Philadelphia 3, Pa., 1612 Market St.

Phoenix 8, Ariz., 234 N. Central St.

Pittsburgh 19, Pa., 1013 New Federal Bldg.

Portland 3, Maine, 142 High St.

Portland 4, Oreg., 520 S. W. Morrison St.

Providence 3, R. I., 631 Industrial Trust Bldg.

Richmond 19, Va., 801 E. Broad St., Room 2, Mezzanine.

St. Louis 1, Mo., 107 New Federal Bldg.

Salt Lake City 1, Utah, 321 Atlas Bldg.

San Antonio 5, Tex., 101 Transit Tower Bldg.

San Diego 1, Calif., 906 Columbia St.

San Francisco 11, Calif., 307 Customhouse.

Savannah, Ga., Room 6, U. S. Courthouse and Post Office Bldg.

Seattle 4, Wash., 809 Federal Office Bldg.

Sioux Falls 6, S. Dak., 310 Policyholders National Bldg.

Syracuse 2, N. Y., 224 Harrison St.

Texarkana 5, Tex., 817 Texarkana Nat'l Bank Bldg.

Wichita 2, Kans., 205 K. F. H. Bldg.

Worcester 8, Mass., 340 Main St.

Digitized by Google

Domestic Commerce

written for

BUSINESSMEN . .

● Here is an authoritative monthly periodical written in the language of the American businessman. It is one of the principal organs of the Department of Commerce for disseminating information deemed of importance in maintaining a vigorous and dynamic free enterprise system.

● Domestic Commerce gives the reader an understanding of the progress and changing conditions of industry and business of the United States. Its writers are officials of this and other Government agencies, and specialists in the various subjects covered.

● Particular attention is given to developments in the field of post-war planning.

[*A sample copy will be sent you upon request to the Bureau of Foreign and Domestic Commerce, Washington 25, D. C.*]

$1.00 per year . . . from the Superintendent of Documents

U. S. GOVERNMENT PRINTING OFFICE • WASHINGTON 25, D. C.

Digitized by Google

cuments Room

Foreign + Domestic Commerce Bureau

Industrial Reference Service

U. S. DEPARTMENT OF COMMERCE, HENRY A. WALLACE, *Secretary*
Office of International Trade, ARTHUR PAUL, *Director*

Part 1. TRANSPORTATION and PUBLIC UTILITIES

Available in Parts Covering Selected Services and Commodities
Annual Subscription $1.50. Price this report 5 cents
For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., or any of the Department's Field Offices

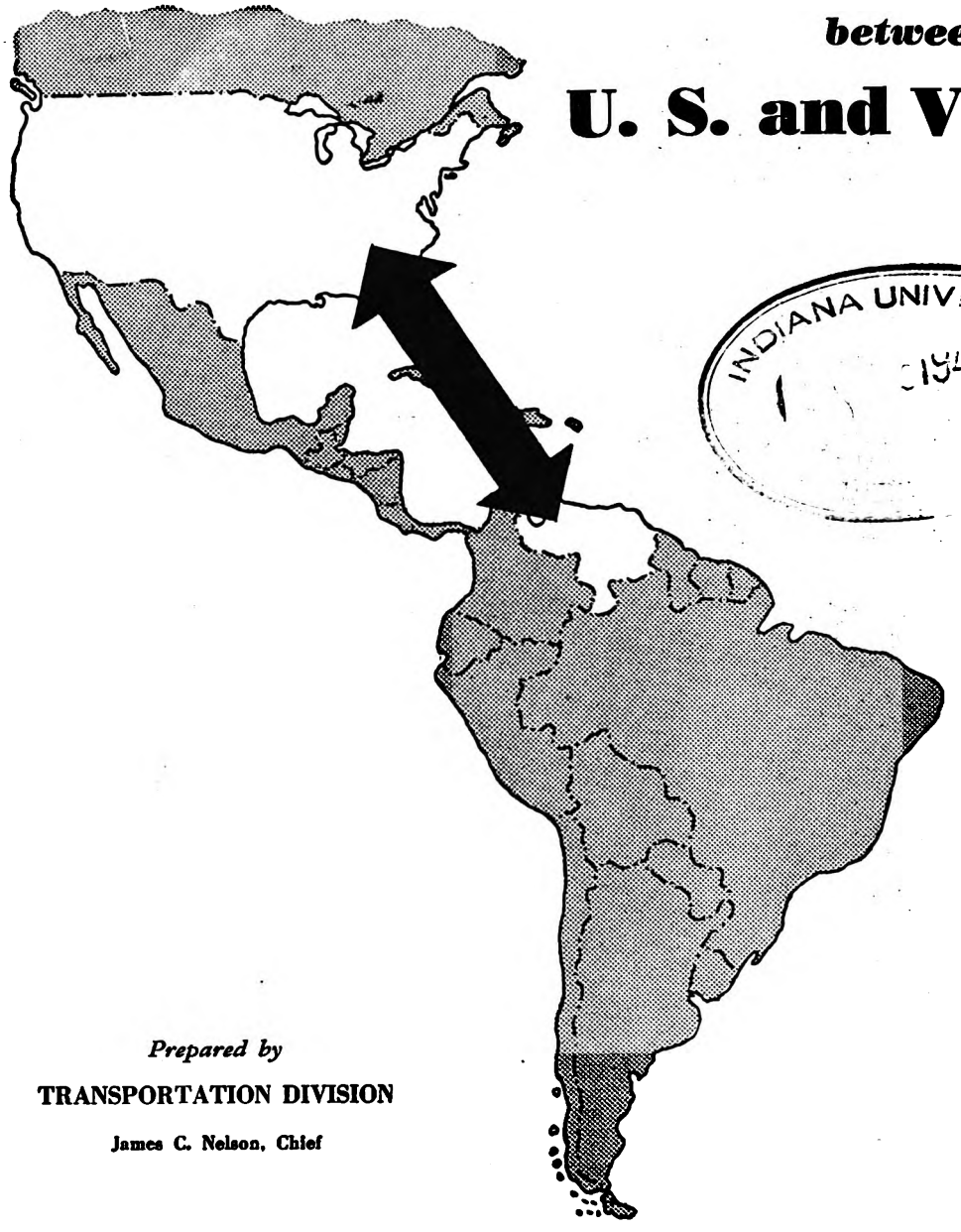
Volume 4—Part 1 August 1946 Number 16

D 16445

AIR-CARGO POTENTIALS

between the

U. S. and VENEZUELA



INDIANA UNIVERSITY
1946

Prepared by
TRANSPORTATION DIVISION
James C. Nelson, Chief

Digitized by Google

Air-Cargo Potentials Between the U. S. and Venezuela

Venezuela, one of the federal unions of America and officially termed the United States of Venezuela, is one of the two northernmost South American countries. It is bounded on the north by the Caribbean Sea, on the east by British Guiana and the Atlantic Ocean, on the south by Brazilian jungles. and on the west by the Republic of Colombia.

The terrain of Venezuela ranges from the Andes mountains almost 15,500 feet high in the north and west (except for Lake Maracaibo), to a central plain extending across the entire country from east to west and to the southern highlands covered with timber and tropical vegetation. The lowland adjacent to Lake Maracaibo at the northwest tip of the country makes a fourth geographic division.

Venezuela is a land of perpetual summer, rich in flowering trees, tropical vines, and orchids. At low altitudes, i.e., below 2500 feet, the climate is hot and humid. However, in the mountains, above 2500 feet, the climate is temperate and is peculiarly adapted to all classes of cultivation. Economically, much of the country is still underdeveloped and its vast resources are only just beginning to be brought into production. Formerly, Venezuela, like many other South American countries, was almost entirely dependent upon exports of coffee and cacao, but since the discovery of rich oil deposits there, funds obtained from the export of petroleum have been used to make great strides toward building roads, cleaning up of unhealthy sanitary conditions, and other forms of economic development.

Venezuela is economically dependent upon the United States. Although that nation ranked fifth in population (3,839,747 in the 1941 census) and sixth in area (over 350,000 square miles) among the South American republics, it ranked first in per capita trade with the United States in 1939 ($21.37); third in value of imports (19.1 percent of the total South American imports from the United States); and fourth in value of total trade (13.8 percent of total U. S.-South American trade) Over 61 percent of Venezuela's total imports for 1939 were furnished by the United States.

Oil exports from Venezuela's wells make her second only to the United States in petroleum export. Leading exports other than petroleum include coffee, cacao, gold, hides and live stock. Principal imports to Venezuela are machinery, iron and steel pipe, motor vehicles, cotton fabrics, pharmaceuticals and wheat flour. The three main shipping ports of Venezuela are La-Guaira, Maracaibo, and Puerto Cabello.

This is a revision of the study of the same title prepared by Mary N. Hardenburgh and issued in October 1944 through the Inquiry Reference Service.

Other countries on which reports of this series have been issued to date include Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador, Guatemala, Honduras, Mexico, Paraguay, Peru, Union of South Africa, U. S. S. R. and Uruguay.

As a nation dependent upon both export and import, Venezuela is acutely aware of the need for expanded transportation. Between 1920 and 1935, roads were built with public funds derived from petroleum royalties, though many of them paralleled the few existing railroads. The oil companies have built 700 miles of roads or about the same as the distance from Chicago to Washington, D. C. Railway facilities are very inadequate. The lines are not connected in one system, gage varies, and rates are high. High cost of railway and highway construction and prevalence of sparsely settled areas, have helped in some sections to foster the transition from mule train to the airplane. Today, the airplane is opening up remote jungle regions some of which have never been explored. Diamond merchants fly into the small town where once or twice a year the Indians bring their pannings from the Caroni River, and gold is being mined after a long period of neglect. An agreement has been made with Brazil to intensify coastal navigation and increase cooperation between the airlines of the two nations.

Venezuela and Colombia are the two countries in South America which provide the best prospects for air-cargo trade with the United States from the point of view of proximity. La Guaira, the principal Venezuelan city served by United States air carriers, is only 1,454 air miles from Miami, or approximately the same air distance as from Denver to Los Angeles.

Leading airlines serving Venezuela include the government-owned Linea Aeropostal Venezolana, the Aerovias Venezolanas and Linea Aerea TACA de Venezuela lines, the Dutch KLM and Pan American Airways. Of the 70 airports in Venezuela at present, 52 are of class 2 and above and are capable of accommodating cargo planes of the DC-2 type which is now being used to carry cargo within the country. Stimulated by wartime restrictions on other types of transportation, aviation expanded greatly during the war. There is no point in Venezuela at present which is more than fifty miles from a point of scheduled air service

Background of Series

The appendix contains an explanation of the purpose of this series of reports on air-cargo potentials. It gives a description of the criteria applied in selecting the commodities classified as potentials, and mentions a number of points of interest to the users of the reports. It is suggested that readers consult that appendix for the methods used and for factors to be considered in formulating conclusions based on the data contained in any individual report of the series.

In all cases, it should be noted that the statistics in the reports refer to aircargo *potentials* and not to predictions of the cargo that will move by air in the future, nor to data of cargo that actually was carried by air in 1939. Failure to observe this fact nas led to misrepresentation of the figures in the reports on some occasions.

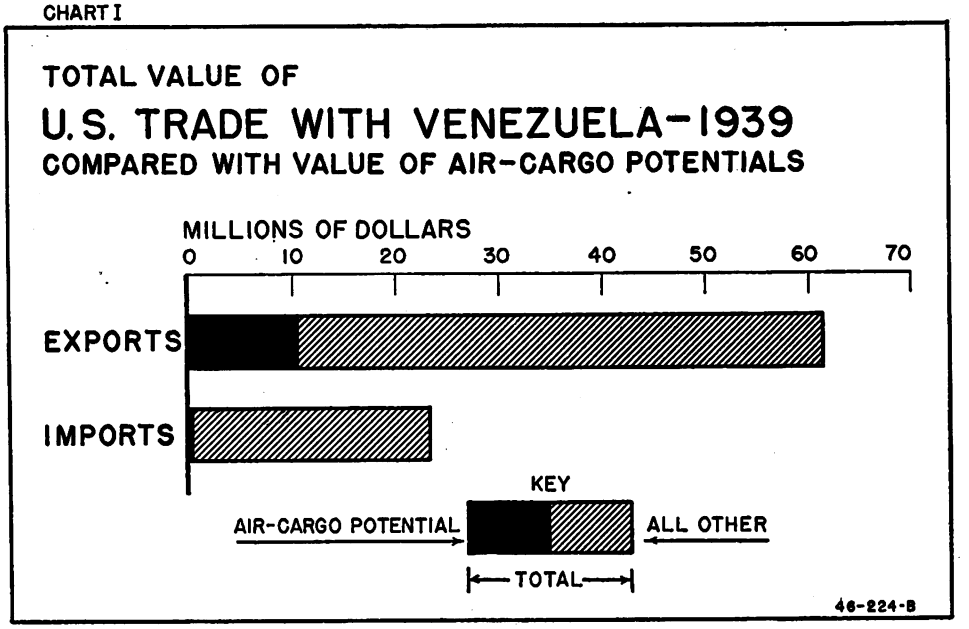
Particular attention should be given to the bases for selection of commodities according to the following categories: fragility, perishability, and style or obsolescence characteristics. In making these studies, all of the commodities falling within these categories have been treated as air-cargo potentials, regardless of value per pound. However, an analysis of the value per pound of individual commodities should nevertheless be made to determine whether all of the items included can properly be considered as potential air cargo under the cost, competition, and equipment conditions of the immediate future.

For instance, it is unlikely that such cargo as bananas will be shipped in volume by air in the near future in view of their low value. The same consideration might apply to grapes, which also have a low value per pound, or to such low-priced export items as lard or dynamite (classified as perishable and fragile, respectively). However, all these commodities have been included in their respective categories for the sake of statistical completeness and because under some conditions they might be shipped by air.

In analyzing commodities, especially for countries bordering on the Caribbean Sea, it should be noted that bananas comprise a very large proportion of the perishable cargo, and, if these were eliminated, there would be a large reduction in total weight of this class of cargo. However, the value of the perishable cargo would not be reduced in the same proportion. In other words, the unit values for the remain-

Digitized by Google

CHART I



ing perishable items would be comparatively high.

Attention is called also to the listing of commodities by value groups. These studies, aside from the three special groups, include only articles valued at $0.50 or more per pound. While the higher-valued articles probably would make up the major portion of the air cargoes, especially during the early development of this trade, values as low as $0.25 per pound are being considered in similar studies as indicating potential air cargo, and some cargo with as low or lower value per pound actually does move by air under present conditions.

Potential Air Cargoes

Table 1 summarizes potential air-cargo trade between the United States and Venezuela in relation to total trade in 1939 (see also chart 1).

A total of 528 commodities have been chosen as air-cargo potentials from the 1939 United States-Venezuelan trade with a total shipping weight of 39,013,165 pounds and a value of $10,643,083. Their value represents 12.5 percent of the total value of the United States-Venezuelan trade.

The average value per pound of potential air exports to Venezuela is $0.30 and of imports $0.04. This extremely low value per pound of imports is due to the large quantities of bananas imported, with a value per pound of $0.02. Without this item the average value of imports would be $2.32, a figure which compares favorably with figures for the other South American countries.

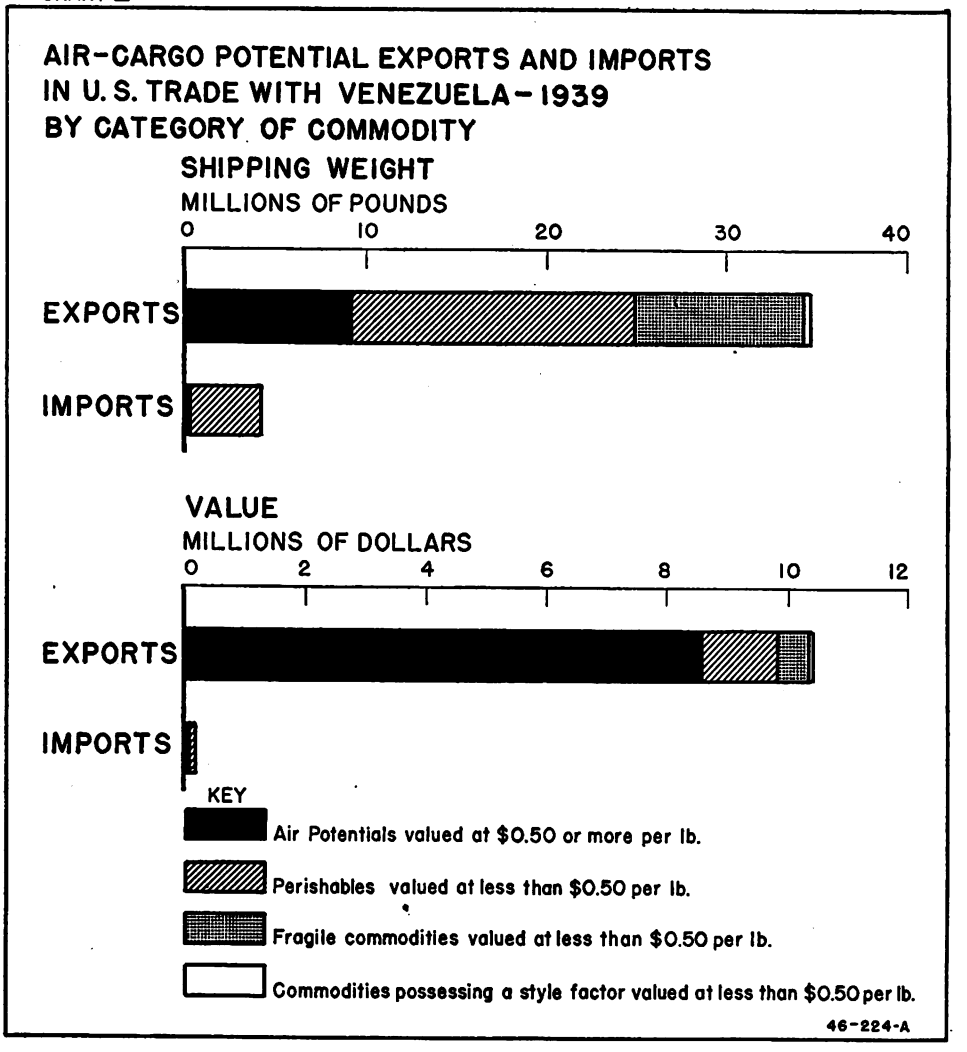
Exports from the United States to Venezuela listed as potential air cargo comprised 508 of the total 1,510 commodities exported. Of the potential air exports, 441 had a value of 50 cents or more a pound, including 90 which had an additional air-cargo characteristic. Also included as export potential air cargo are 38 perishables and 28 fragile commodities, and 5 items having style characteristics, all with values below 50 cents a pound (see chart 2).

Import air-cargo potentials comprised 20 of a total of 74 import commodities. Of these 20 commodities, 18 were valued at more than 50 cents a pound. The other two commodities were perishable with values of less than 50 cents a pound.

Export Commodities

Exports valued at $0.50 a pound and above totaled 9,366,209 pounds valued at $8,638,871. The air-cargo potentials valued over $3 per pound which are shipped in the most substantial quantities are women's and children's silk hosiery, tooth brushes, rayon and synthetic textile dresses and skirts, serums and antitoxins, and neckties. Ex-

CHART II



Digitized by Google

ports of these commodities total 69,542 pounds, valued at $280,153, making up 54.6 percent of the weight of commodities valued at $3 and above, and 44.8 percent of the value. The commodities having the highest value per pound are jewelry, dental gold and alloys, and sewing-machine needles, but as a result of the comparatively small quantities moving in trade, these items warrant less consideration.

Forty-four export commodities were selected as perishable with a total value of $1,378,831 and weight of 16,048,534 pounds, averaging $0.08 per pound. The leading commodity in this group is lard which represents 81.4 percent of the weight of the perishables. Without lard, the perishables amount to 2,980,372 pounds, valued at $470,328, with the average value per pound increased to $0.16. Fresh vegetables, grapes, pears, and cattle are other perishables shipped in rather large quantities.

Fragile commodities exported to Venezuela are valued at $2,325,937 and weigh 10,911,972 pounds, which represents about one-quarter of the total air-cargo potential exports. However, of these fragile items, glassware accounts for 7,801,730 pounds valued at only $0.04 a pound, and dynamite for 1,049,623 pounds valued at only $0.15 per pound. Most of the other fragile commodities, however, had a value of $.50 per pound or more; the total value of such commodities was $1,741,619, and their weight, 1,481,802 pounds. Those fragile commodities which appear to present the best prospects are radio-receiving sets, X-ray apparatus and parts, metal filament lamps, standard typewriters, and scientific laboratory and professional instruments.

The 26 style-factor commodities exported to Venezuela weighed 257,126 pounds and were valued at $238,757. The best air-cargo prospects among the style-factor commodities appear to be motion-picture film, phonograph records, catalogs and pamphlets, women's and children's handbags of materials other than leather, rayon and synthetic textile dresses, and bathing suits.

Import Commodities

Eighteen of the commodities imported from Venezuela in 1939 were valued at more than $0.50 per pound. Their total weight was 41,534 pounds and total value, $96,475. The only high-valued item imported from Venezuela in appreciable volume was orchid plants, with an average value per pound of $5.18. The somewhat lower-valued tonka beans and reptile skins were also shipped in large quantities. The latter two items had a value of $61,740 and weighed 33,605 pounds, making their average value per pound, $1.84.

TABLE 1.—*Potential Air-Cargo Trade Between the United States and Venezuela in Relation to Total Trade in 1939*

Summary item	Number of commodities	Shipping weight	Value
		(*Pounds*)	
Total trade with Venezuela:			
United States exports	1,510	[1]	$61,588,221
United States imports	74	[1]	23,414,943
Total	1,584	[1]	$85,003,164
Air-cargo potentials:			
United States exports	508	34,710,581	$10,479,074
United States imports	20	4,302,584	164,009
Total	528	39,013,165	$20,643,083
Ratio of air-cargo potentials to total trade:	(*Percent*)	(*Percent*)	(*Percent*)
United States exports	33.6	[1]	17.0
United States imports	27.0	[1]	0.7
Exports and imports	33.3	[1]	12.5

[1] Not available.

Source: *Foreign Commerce and Navigation of the United States, calendar year 1939.* Since shipping weights were not recorded in 1939, the shipping weight pounds were derived by applying shipping weight factors of 1943 trade to the 1939 net weight pounds as given in the mentioned source.

TABLE 2.—*Actual Air Traffic Between the United States and Venezuela for Specified Months of 1944, by Value Groups*

Value per pound groups	Number of commodities	Shipping weight		Value		Average value per pound
		Gross pounds	Percent of total	Dollars	Percent of total	
United States Air Exports—August 1944						
Less than $0.50	12	1,783	10.06	$ 581	.61	$0.33
0.50 to 0.99	18	1,611	9.09	1,217	1.28	.76
1.00 to 1.99	33	5,184	29.26	6,200	6.53	1.20
2.00 to 2.99	26	1,469	8.29	3,512	3.70	2.39
3.00 to 3.99	17	1,645	9.28	2,689	5.99	3.46
4.00 to 4.99	15	617	3.48	2,906	3.06	4.71
5.00 to 9.99	52	3,255	18.37	22,130	23.31	6.80
10.00 to 24.99	40	1,766	9.97	26,359	27.76	14.93
25.00 and over	20	390	2.20	26,356	27.76	67.58
Total	233	17,720	100.00	94,950	100.00	5.36
United States Air Imports—Calendar Year 1944						
Less than $0.50	5	291	4.05	$ 83	[1]	$0.29
0.50 to 0.99	12	329	4.58	227	[1]	.69
1.00 to 1.99	24	267	3.71	363	[1]	1.36
2.00 to 2.99	12	1,188	16.54	3,082	[1]	2.59
3.00 to 3.99	10	155	2.16	472	[1]	3.05
4.00 to 4.99	8	40	[1]	186	[1]	4.65
5.00 to 9.99	22	4,517	62.88	36,381	4.63	8.05
10.00 to 24.99	11	170	2.37	2,034	[1]	11.96
25.00 and over	9	226	3.15	743,235	94.55	3,288.65
Total	113	7,183	100.00	786,063	100.00	109.43

[1] Less than 1 percent.

Source: *General Imports Into the United States by Air calendar year 1944; United States Exports by Air of Domestic and Foreign Merchandise, August 1944.* U. S. Department of Commerce, Bureau of the Census.

Bananas accounted for almost all of the perishable import commodities moving from Venezuela to the United States and represented 99 percent (4,261,050 pounds) of the volume and 41.4 percent ($67,480) of the total value of potential air-cargo imports. However, since the per pound value of bananas is very low there is little probability of an air-cargo trade in that commodity for the immediate future. With the elimination of bananas, orchids remain the only significant perishable import item, totaling 6,129 pounds valued at $31,793.

Virtually the only import commodity classified as fragile was orchid plants, which item has also been considered as perishable, as noted above. Style-factor imports were negligible: only a few motion-picture films were imported from Venezuela in 1939.

Actual Air Shipments

Preceding sections have discussed air-cargo potentialities in terms of the total trade with Venezuela in 1939. There is now available a limited amount of data on actual air-cargo traffic for certain periods in 1944 and 1945. Despite the limited nature of these data, and the abnormal wartime period to which they refer, it is interesting to consider briefly the highlights of these statistics.

Table 2 summarizes the total air-cargo traffic for certain periods in 1944; some of the leading commodities moved are listed in tables 3 and 4,

Digitized by Google

Imports by air from Venezuela for 1944 amounted to 7,183 pounds and were valued at $786,063, with an average value per pound of $109.43. Exports by air to Venezuela in August 1944 totaled 17,720 pounds and $94,950, with an average value per pound of $5.36.

Table 2 reveals that the bulk of the actual air trade between United States and Venezuela had relatively high values per pound. More than 75 percent of the value of air exports in August 1944 was represented by commodities with values per pound of more than $5. The distribution in terms of weight was less concentrated, with items valued at more than $5 per pound accounting for approximately 30 percent of the total weight of air exports.

More than 99 percent of the total value imported during the calendar year 1944 was represented by commodities valued at $5 per pound or more. (Most of this value was accounted for by a few shipments of diamonds). Approximately 68 percent of the total weight of air imports were in this value range.

Exported periodicals, with a value of $0.34 per pound, was the only item in the less than $0.50 range which moved in a large volume by air during the period considered.

It may be pointed out that the weight of the actual air exports for the single month of August 1944 was about 2½ times as great as that for air imports of the entire year. Were export and import data adjusted to comparable periods, the air export weight would be slightly over 20 times greater than the weight of actual air imports. In terms of value, the unbalance between exports and imports is much less striking, amounting to a ratio of roughly 1.2 to 1 after adjustment to comparable periods. This is explained almost entirely by a few import shipments of diamonds and pearls, which resulted in a very high value of air imports.

The Return-Haul Problem

If the air trade between the United States and Venezuela follows the pattern in volume and value considered as air-cargo potentials in this study the unbalance in air exports and imports would be an important economic problem. Potential air exports from the United States to Venezuela in 1939 were 64 times greater by value than imports, and 8 times greater by shipping weight.

To get a better picture of the return-haul problem, it would probably help to exclude the very low-valued commodities whose bulk shipment could not be profitably accomplished by air movement under present conditions. The elimination of these items is a difficult problem, though a few of them are clearly unsuitable for bulk air shipment. Such export items include lard, beverage bottles, glass containers, dynamite, and the import item of bananas. If those commodities are excluded from the list of air-cargo potentials, the average value per pound of imports from Venezuela rises from $0.04 a pound to $2.32, and the average value per pound of potential exports, from $0.30 to $0.60 a pound. The ratio of air-cargo potential exports to imports on a weight basis after the above exclusions is more than 300 to 1 and on a value basis is 96 to 1.

TABLE 3.—*Principal United States Air Exports to Venezuela*[1]
August 1944
[Arranged in Descending Order of Shipping Weight]

Commodity	Shipping weight (Pounds)	Value	Value per pound
Merchandise valued $10 or less	2,393	$2,534	$1.06
Periodicals	1,178	401	.34
Auto parts replacement	835	1,120	1.34
Phonograph records	809	942	1.16
Motion picture features exposed 35 mm positive	689	2,122	3.08
Glandular products	522	5,602	10.73
Radio transmitting sets containing mica	427	2,274	5.33
Motion picture newsreels exposed, positive	393	847	2.16
Vaccines, human use	353	2,723	7.71
Machinery metalwork sheet, etc.	352	1,689	4.80
Office supplies	352	241	.68
Internal combustion engines, accessories and parts	332	832	2.51
Women's and children's synthetic hosiery, except nylon	330	2,560	7.76
Tractor parts, etc., track	302	415	1.37
Synthetic dresses, etc., not knit	295	1,478	5.01
Medicinal chemicals for prescription use	280	5,471	19.54
Machinery, etc., print, typeset	272	262	.96
Vitamines, viosterols	255	1,571	6.16
Hoists and winches, except mine	252	112	.44
Eyeglasses, etc., and frames	250	46,113	18.45
Well drill apparatus, petroleum gas	217	1,771	8.16
Corsets, brassiers, girdles	211	1,530	7.25
Pens, fountain and stylographic plastic	162	8,167	50.41
Fur wearing apparel	140	2,203	15.74
Serums, antitoxins for human use	135	1,277	9.46
Photographs and blueprints	79	1,238	15.67
Elixirs, liquid solutions	60	2,011	33.52
Jewelry, etc., gold or platinum	42	6,294	149.86
Needles, except sewing machine	35	1,117	31.91
Jewelry, men's, except gold or platinum	13	1,733	133.31
Teeth	12	1,142	95.17
Dental metals, precious	8	2,022	252.75
Gold manufactures	3	1,495	498.33

[1] Commodities with a total shipping weight of at least 200 pounds or a total value of at least $1,000 have been included.

Source: *United States Exports by Air of Domestic and Foreign Merchandise, August 1944*, U. S. Department of Commerce, Bureau of the Census.

TABLE 4.—*Principal United States Air Imports From Venezuela*[1]
Calendar Year 1944
[Arranged in Descending Order of Shipping Weight]

Commodity	Shipping weight (Pounds)	Value	Value per pound
U. S. articles returned	3,354	$28,584	$8.52
Orchid plants	836	2,246	2.68
Photographic dry plates, American manufacture returned	534	3,103	5.81
Maps, charts, blank books, etc.	213	1,352	6.35
Stamps and stamped envelopes, foreign	80	14,875	185.94
Natural pearls and parts	58	30,228	521.17
Diamond bort	42	552,950	13,165.48
Paintings, drawings, etc., original	15	2,762	184.13
Diamonds, rough or uncut	12	140,641	11,720.08

[1] Commodities with a total shipping weight of at least 200 pounds or a total value of at least $1,000 have been included.

Source: *General Imports, Into the United States by Air, calendar year 1944*. U. S. Department of Commerce, Bureau of the Census.

Summary

Two factors work against a profitable air-cargo trade between the United States and Venezuela: (1) The potential air-cargo trade is so heavily weighted on the side of exports that the costs per ton-mile in both directions will remain high unless some pay-load can be found to fill the northbound planes; (2) The greater part of the enormous volume of potential trade is in low-valued commodities.

However, two elements favor an air-cargo trade with Venezuela: (1) The country's proximity to the United States; and (2) the fact that Venezuela is economically dependent on the United States for a very high volume of import goods.

Data Included in Tables

The following tables give details of the air-cargo potentials itemized and are grouped for convenient reference. Table 5 summarizes, by value groups items valued at $0.50 a pound and over. Table 6 lists perishables, fragiles, and those commodities possessing a style or obsolescence characteristic. These categories have no lower limit as to value per pound. Tables 7 to 10 contain itemized lists of the commodities summarized in tables 5 and 6, giving their weight, value per pound, and density.

Digitized by Google

TABLE 5.—*Summary of Commodities Valued $0.50 or More Per Pound in United States Trade With Venezuela—1939*

[Category 1]

	Commodities			Shippnig Weight		Value		
	Number	Percent of air-cargo potentials	Percent of total trade	Gross pounds	Percent of air-cargo potentials	Dollars	Percent of air-cargo potentials	Percent of total trade
U. S. Exports—								
Group Value per pound:								
1 $0.50 to $0.99	192	37.8	12.7	6,644,220	19.1	4,487,015	42.8	7.3
2 1.00 to 1.99	136	26.8	9.0	2,348,999	6.8	2,931,374	27.9	4.8
3 2.00 to 2.99	41	8.0	2.7	245,517	.7	595,884	5.7	1.0
4 3.00 to 3.99	23	4.5	1.5	73,995	.2	267,451	2.6	.4
5 4.00 to 4.99	13	2.6	.9	17,076	.1	71,848	.7	.1
6 5.00 to 9.99	24	4.7	1.6	32,905	.1	203,261	1.9	.3
7 10.00 to 24.99	7	1.4	.5	2,943	[1]	52,661	.5	.1
8 25.00 and over	5	1.0	.3	554	[1]	29,377	.3	[1]
Total valued $0.50 or over	441	86.8	29.2	9,366,209	27.0	8,638,871	82.4	14.0
Total air-cargo potentials[2]	508	100.0	33.6	34,710,581	100.0	10,479,074	100.0	17.0
Total exports to Venezuela	1,510	.....	100.0	[3]	.....	61,588,221	.....	100.0
U. S. Imports—								
Group Value per pound:								
1 $0.50 to $0.99	2	10.0	2.7	764	[1]	520	.3	[1]
2 1.00 to 1.99	5	25.0	6.8	33,764	.1	60,975	37.2	.3
3 2.00 to 2.99	4	20.0	5.4	844	[1]	1,690	1.0	[1]
4 3.00 to 3.99	.....	.....	.....	.....	.....	.....	.....	.....
5 4.00 to 4.99	.....	.....	.....	.....	.....	.....	.....	.....
6 5.00 to 9.99	2	10.0	2.7	6,134	[1]	31,818	19.4	.1
7 10.00 to 24.99	2	10.0	2.7	10	[1]	122	.1	[1]
8 25.00 and over	3	15.0	4.0	18	[1]	1,350	.8	[1]
Total valued $0.50 or over	18	90.0	24.3	41,534	.1	96,475	58.8	.4
Total air-cargo potentials[2]	20	100.0	27.0	4,302,584	100.0	164,009	100.0	.7
Total imports to Venezuela	74	.....	100.0	[3]	.....	23,414,943	.....	100.0

[1] Less than .05 percent.

[2] Includes in addition to commodities valued $0.50 or more per pound, those commodities, valued less than $0.50 per pound, selected because of perishability, fragility, or as possessing a style factor. A commodity appearing in more than one category is accounted for only once in arriving at the total figures.

[3] Not available.

Source: *Foreign Commerce and Navigation of the United States, calendar year 1939*, U. S. Department of Commerce.

TABLE 6.—*Summary of Commodities Possessing Perishability, Fragility, or Style Factor in United States Trade With Venezuela—1939*

Categories	Commodities			Shippnig Weight		Value		
	Number	Percent of air-cargo potentials[1]	Percent of total trade	Gross pounds	Percent of air-cargo potentials[1]	Dollars	Percent of air-cargo potentials[1]	Percent of total trade
U. S. Exports, Value per pound:								
Perishable commodities (category 2)								
Less than $0.50	38	7.4	2.5	15,972,405	45.9	1,242,838	12.4	2.0
$0.50 or more	6	1.2	0.4	76.129	0.2	135,993	1.4	0.2
Total	44	8.6	2.9	16,048,534	46.1	1,378,831	13.8	2.2
Fragile commodities (category 3)								
Less than $0.50	28	5.5	1.8	9,430,170	27.2	584,318	5.9	1.0
$0.50 or more	63	12.4	4.2	1,481,802	4.3	1,741,619	17.4	2.8
Total	91	17.9	6.0	10,911,972	31.5	2,325,937	23.3	3.8
Commodities possessing style factor (category 4)								
Less than $0.50	5	1.0	0.3	165,779	4.8	59,955	0.6	0.1
$0.50 or more	21	4.1	1.4	91,347	2.6	188,802	1.9	0.3
Total	26	5.1	1.7	257,126	7.4	248,757	2.5	0.4
U. S. Imports, Value per pound:								
Perishable commodities (category 2)								
Less than $0.50	2	10.0	2.7	4,261,050	99.0	67,534	41.2	0.3
$0.50 or more	4	20.0	5.4	6,974	[2]	33,498	20.4	[2]
Total	6	30.0	8.1	4,268,024	99.0	101,032	61.6	0.3
Fragile commodities (category 3)								
Less than $0.50	.....	.....	.....	.....	.....	.....	.....	.....
$0.50 or more	2	10.0	2.7	6,129	0.1	31,809	19.4	0.1
Total	2	10.0	2.7	6,129	0.1	31,809	19.4	0.1
Commodities possessing style factor (category 4)								
Less than $0.50	.....	.....	.....	.....	.....	.....	.....	.....
$0.50 or more	2	10.0	2.7	64	[2]	249	[2]	[2]
Total	2	10.0	2.7	64	[2]	249	[2]	[2]

[1] See table 5 for figures on total Air-Cargo Potentials.

[2] Less than 0.05 percent.

Source: *Foreign Commerce and Navigation of the United States, calendar year 1939*, U. S. Department of Commerce.

Digitized by Google

TABLE 7.—*Commodities Valued at $0.50 or More Per Pound in United States Trade With Venezuela—1939*

[Group 1—Commodities valued from $0.50 to $0.99 per pound]

Class No.	Commodity	Shipping weight	Value	Value per pound	Density
		(*Pounds*)			
	Exports				
0019	Poultry, live	13,287	$8,259	$0.62	[1]
0046	Sausage casings, hog	1,326	1,032	0.78	44
0099	"Other" edible animal products [2]	17,696	9,202	0.52	[1]
	Upper leather (except patent):				
0300	Cattle, side, grain, black	35,882	28,199	0.79	18
0301	Cattle, side, grain, other than black	111,547	67,911	0.61	av. 21
0302	Cattle, side, finished splits	4,983	3,303	0.66	av. 21
0305	Calf and kip (other than black)	256,817	229,511	0.89	av. 18
0307	Sheep and lamb	12,805	11,104	0.87	av. 21
0310	Horse and colt	1,589	1,204	0.76	av. 21
0311	Other [2]	7,463	4,216	0.56	av. 21
	Patent upper leather:				
0313	Goat and kid	1,584	1,392	0.88	10
0319	"Other" than cattle, whole calf and kip or goat and kid	1,975	1,885	0.95	10
	Lining leather:				
0321	Sheep and lamb	15,389	11,540	0.75	31
0323	Other than sheep or lamb	6,638	4,215	0.63	31
0324	Sole leather: bends, backs and sides	70	58	0.83	34–53
0328	Boot and shoe cut stock	120	61	0.51	18–30
0339	Glove and garment leather other than sheep and lamb	134	128	0.96	19
0356	Case, bag, and strap leather	797	610	0.76	18–30
0600	Leather welting	14,521	8,800	0.62	17
	Boots and shoes with leather uppers:				
0645	Men's	353,080	280,091	0.79	14
0648	Infants' and children's	4,499	3,085	0.69	9
0656	Boots, shoes and other footwear with uppers of material other than leather	581	551	0.95	av. 12
0659	Shoes, discontinued models, old styles and second hand	11	7	0.64	av. 12
0688	Women's and children's handbags, pocketbooks and purses of materials other than leather	27,500	19,382	0.70	9
0697	Belts to be worn on the person	47,741	41,726	0.87	8
0699	"Other" leather manufactures	17,997	15,963	0.89	[1]
1513	Coffee extracts and substitutes	316	159	0.50	25
2034	Canvas shoes with rubber soles	31,076	23,073	0.74	14
2042	Druggists' rubber sundries, other than water bottles and fountain syringes	33,772	28,673	0.85	13
2043	Clothing of rubber or of rubberized cloth	55,045	37,636	0.68	15
2046	Rubber toys and balls	19,575	14,290	0.73	18
2048	Rubber bands	2,801	1,398	0.50	8
2049	Rubber erasers	2,042	1,446	0.71	26
2086	Rubber and balata belting (other than auto fan belts)	47,831	38,347	0.80	av. 35
2096	Gutta-percha manufactures	264	234	0.89	[1]
2622	Cigarettes	227,729	161,999	0.71	av. 22
3015	Cotton sewing thread	21,872	14,678	0.67	21–34
3016	Crochet, darning, and embroidery cotton	150	114	0.76	11
3039	Grey cotton cloth, unbleached (other than drills, twills, sheetings, sateens)	12,846	6,943	0.54	av. 34
	Cotton cloth, drills, twists, and warp sateens:				
3043	Printed, 40 inches wide or less	83,252	43,019	0.52	29
3045.1	Not printed, wider than 40 inches	786	776	0.99	av. 11
3049.2	Carded broadcloth, printed	90,670	57,624	0.64	20–25
	Cotton printcloth, yarn fabrics:				
3051.1	Bleached	13,691	6,788	0.50	42
3052.1	Dyed in the piece	12,467	9,046	0.72	35
3052.2	Printed	452,573	257,872	0.57	33
3067	Voiles, organdies, lawns, batiste, combed	260,665	195,680	0.75	av. 10
3073	Marquisettes, combed	7,021	4,176	0.60	av. 10
3074	Combed and fine carded goods [2], other than voiles, etc., marquisettes and piques	94,882	56,423	0.60	10–18
3087	Cotton knit fabric in the piece, plushes	3,878	2,663	0.69	av. 15
	Cotton knitwear:				
3098	Women's and children's nightwear	193	127	0.66	7
3099.1	Men's and boys' sweaters, jersey pullovers and sweat shirts	327	247	0.76	av. 7
3099.9	"Other" knit outerwear [2]	510	360	0.71	7–22
	Cotton wearing apparel, not knit:				
3114	Overalls, breaches, pants, aprons and men's work clothing [2]	15,429	14,064	0.86	25
3117.1	Work shirts	2,043	1,589	0.78	10
3140	Cotton woven belting for machinery	300	288	0.96	37
3181	Cotton curtains and draperies	871	609	0.70	8
3187	Cotton terry-woven towels, wash cloths and bath mats	12,439	6,870	0.55	12
3189	"Other" cotton housefurnishings [2]	2,202	1,231	0.56	[1]
3399	Flax, hemp, and ramie manufactures	7,361	7,030	0.96	[1]
3649	Wool fabrics, other than wool and mohair cloth	5,284	4,266	0.81	16
3699	Hair manufactures, "Other"	2,272	1,168	0.51	[1]
	Rayon and synthetic textiles:				
3840	Yarn, single and plied	35,024	17,521	0.50	av. 24
3850	Housefurnishings	92	81	0.88	[1]
3858.5	Braids, fringes and narrow trimmings	207	185	0.89	12
3913	Window shade cloth	106	96	0.90	52
3914.2	Book cloth (all types), starch filled	1,437	822	0.57	29–33
3915	Pyroxylin coated or impregnated fabrics	28,424	19,335	0.68	34
3940	Hat braids, strips and sheets of natural fibers or synthetic textiles	3,760	2,632	0.70	14
3988	Elastic webbing, woven, knitted, or braided not over 1½ inches wide	17,839	9,579	0.54	av. 22
4227	Sash and blinds	10,732	7,271	0.68	6
5291	Chemical glassware	18,698	12,967	0.69	av. 7
5474	Carbon and graphite, brushes and stock	2,544	1,272	0.50	30
5478	Lighting carbons	3,036	2,790	0.92	43–81
6037.5	Stainless steel strip, hoop, band, and scroll; cold rolled	840	442	0.53	89–428
6116	Butchers' and kitchen knives, forks, cleavers and steels	8,020	7,056	0.88	av. 50
6146	Gasoline stoves and room and water heaters	11,061	10,513	0.95	9
6150	Domestic oil burners	20,503	10,238	0.50	6
6155.1	Circular saws	2,592	1,729	0.67	34
6156	Cross cut, hand, back and other saws [2]	11,134	6,111	0.60	21–30
6169	Hand operated pipe stocks and dies, die stocks, dies and bushings	21,373	15,602	0.73	53–120
6170	Hand operated pipe cutters and other metal cutting tools [2]	6,007	3,340	0.56	53–120
6173	"Other" pliers, pincers, nippers and splicing clamps	3,340	3,183	0.95	49–90
6178.9	"Other" hand tools and parts	128,203	127,434	0.99	28–141
6180	Doorlocks and lock sets of iron, steel, brass and bronze	17,340	9,214	0.53	46
6182	Hinges and butts, iron or steel	10,177	5,293	0.52	35–90
6303	Aluminum plates, sheets, strips, bars and rods	207	130	0.63	76–110
6308	Aluminum and alumin9m bronze powder	5,574	3,526	0.63	19–113
	Brass and bronze:				
6454	Pipe fittings and valves	165,142	91,358	0.55	28–112
6456	Plumbers' brass goods	57,565	29,503	0.51	63–108
6458	Brass wood screws whether or not plated	2,912	2,296	0.79	52–61
6469	"Other" hardware	23,903	13,338	0.56	10–90
6545	Nickel, Monel metal and alloys in ingots, bars, rods, sheets, plates, etc	4,490	2,651	0.59	37–115

Digitized by Google

TABLE 7.—*Commodities Valued at $0.50 or More Per Pound in United States Trade with Venezuela—1939 (Continued)*

[Group 1—Commodities valued from $0.50 to $0.99 per pound]

Class No.	Commodity	Shipping weight	Value	Value per pound	Density
	Exports—Continued	(*Pounds*)			
	Silver plated ware:				
6958	Knives, forks and steak sets	3,512	$2,662	$0.76	17–43
6959	"Other"	11,187	9,095	0.81	17–43
7000	Generators, direct current	60,223	32,099	0.53	51
7011	Self contained lighting outfits	432,166	219,108	0.51	[1]
7019	Capacitors, ½ kilovolt ampere and larger	6,472	4,213	0.65	120–160
7027.1	Rotating converters, under 300 kilowatts	7,345	6,831	0.93	51
7028	Complete battery chargers, non-rotating	13,800	7,452	0.54	15–26
7030	Feeder voltage regulators	5,812	3,673	0.63	100–140
7034	Fuses	13,097	8,801	0.67	22
7035	Watt hour and other measuring meters	10,506	8,477	0.85	37–64
7040	Motors, starters and controllers, ½ horsepower and under	12,415	6,729	0.54	[1]
7056	Portable electric tools	36,836	25,159	0.68	24–140
7060	Flashlight cases	187,808	102,731	0.55	10
	Electric incandescent lamps:				
7064	Metal filament, other than for flashlights, autos, and Christmas trees	77,864	52,480	0.67	5–12
7065	"Other"	9,394	4,697	0.50	4–12
7069.1	Electric domestic vacuum cleaners	11,018	5,674	0.52	8–33
7069.3	Electric domestic vacuum cleaner parts	169	89	0.53	8–33
7073.1	Domestic electric heaters and ovens	8,227	4,171	0.51	6–11
7075.5	X-ray apparatus and parts other than tubes	105,371	82,611	0.78	14–60
7089	Bells, buzzers, annunciators, and alarms	2,268	2,102	0.93	24
7095	Sockets, outlets, fuse blocks, lighting switches and parts	40,379	33,151	0.82	20
7142	Stationary and portable engines, Diesel and semi-Diesel	197,916	154,770	0.78	95
7311	Mining and quarrying machinery—rock drills	26,356	17,448	0.66	16–157
	Power driven metal working machinery:				
7400	Thread cutters and automatic screws	34,365	19,004	0.55	26–35
7408	"Other" milling machines	18,481	9,610	0.52	47
7442	Tool grinding, cutter grinding, and universal grinding machines	4,804	2,421	0.50	31–49
7443	"Other" grinders and parts	14,859	11,355	0.76	31–49
7455	"Other" machines and parts	97,210	51,716	0.53	18–49
7458	Portable and hand or foot operated metal-working machinery and parts, "other"	92,112	54,254	0.59	15–69
7471	Chucks for machine tools	280	258	0.92	42–78
	Knitting machinery, power driven:				
7502	Circular, other than hosiery	10,776	819	0.76	18–28
7504	Other than circular and parts	3,894	3,544	0.91	15–46
7552	Sewing machines for factory or industrial use	117,343	70,758	0.60	5–37
7590	Cigarette and cigar making and other tobacco machinery and parts	66,506	36,379	0.55	213
7691	Ball bearings and parts except balls	2,638	2,060	0.78	50–120
7692	Roller bearings and parts except rollers	5,982	4,666	0.78	50–120
7760	Accounting and calculating machines, used and rebuilt and "other"	1,407	1,390	0.99	13–28
7763	Duplicating machines, parts and supplies for	74,870	42,451	0.57	av. 18
7767	Cash register parts	3,126	3,042	0.97	23
	Typewriters:				
7770	Standard, new	120,636	100,007	0.83	19
7772	Portable, new	74,280	60,687	0.82	av. 24
7774.1	Rebuilt	26,470	14,876	0.56	20
7774.9	"Other" used	1,142	717	0.63	20
7790	Type setting machines	88,427	53,675	0.61	av. 23
7795	"Other" printing and type setting machines, parts and accessories	84,117	54,676	0.65	23–55
7802	Dairy equipment and parts for farm use, other than separators and bee equipment	9,382	5,948	0.63	10–22
7916	Automatic piston rings	6,717	5,515	0.82	24
7917	Automatic valves	643	392	0.61	15
7921	Spark plugs	45,465	41,782	0.92	av. 49
7954	Motorcycle parts and accessories (except tires)	1,803	1,131	0.63	[1]
	Coal tar products:				
8059	Colors, dyes, stains, and color lakes	36,774	34,678	0.94	18–58
8069	"Other" finished products	2,952	1,597	0.54	[1]
8120	Biologics for animal and veterinary use	25,176	22,230	0.88	[1]
8130	Medicinal and reagent chemicals	32,069	23,731	0.74	23
8149	Corn and foot remedies	3,910	3,093	0.79	14
8152	Salves and ointment for burns, cuts, skin diseases, insect bites, inflammation, etc.	96,241	64,578	0.67	33
8180	"Other" proprietary medicinal preparations	180,676	104,250	0.58	30–45
8200	Nicotine sulphate (40% basis)	390	230	0.59	34
8264	Pyroxylin sheets, rods, tubes, and other unfinished forms	8,375	6,054	0.72	10–68
8296	Pectin	1,222	858	0.70	28–52
8601	Explosive, smokeless powder	2,009	1,259	0.63	53
8710	Soap, medicated	58,846	31,221	0.56	55
8718	Shaving creams	15,991	8,360	0.52	22
8719	Shaving cakes, powders and sticks	1,084	633	0.58	32
8734	Dental creams	218,404	159,019	0.73	31
8735	"Other" dentifrices	3,979	2,057	0.52	av. 23
8742	Face and compact powder	28,088	16,263	0.58	43
8757	"Other" cosmetics	6,771	4,977	0.74	30
8766	Perfumery and toilet waters	3,198	3,099	0.97	25
9003	Cameras, box type, set focus	3,322	2,558	0.77	17–40
9008.1	Motion picture projectors, sub-standard gauge (less 35 mm.) silent	3,122	1,817	0.58	20–28
9011	Motion picture reproducing equipment	27,121	25,412	0.94	av. 11
9129	Photographic paper	48,598	41,817	0.86	20
9140	Photographic apparatus and supplies, "other"	56,747	43,922	0.77	27
9155	Dental equipment and supplies, "other"	148,594	92,871	0.62	8–62
9232	Organs, other than pipe	819	775	0.95	9
9245	Percussion instruments	412	381	0.92	2–14
9295	Musical instruments, "other"	118	117	0.99	2–27
9297	Musical instrument parts and accessories	13,462	7,229	0.54	8–18
9304	Pencils, other than plastic mechanical	57,822	50,792	0.88	17–30
9319	Pen holders and parts, "other"	1,229	654	0.53	14–42
9422	Fishing tackle and parts other than reels and rods	2,109	1,525	0.72	av. 30
9434	Balls, foot, basket, base, tennis, and other	18,243	16,911	0.93	9–30
9472	Rifles	577	477	0.83	av. 28
9473	Shotguns	21,653	10,994	0.51	av. 29
9490	Shot shells	1,225	777	0.63	76
9565	Playing cards	833	498	0.60	48
	Clocks:				
9570	Electric	4,388	2,574	0.59	16
9571	1-day alarm	26,714	24,913	0.93	26–40
9591	Time recording devices and parts	12,718	9,920	0.78	[1]
	Lamps:				
9793	Gasoline pressure, lanterns and parts	29,243	16,230	0.56	9–17
9794	Other than wick or gasoline pressure	25,647	13,034	0.51	3–22
9810	Synthetic resin laminated sheets, plates and rods	241	131	0.54	[1]
9813	Synthetic resin products, other than cast and laminated sheets and molded products	359	230	0.64	[1]
9819	Manufactures of cellulose acetate [2]	898	610	0.68	[1]

Digitized by Google

TABLE 7.—*Commodities Valued at $0.50 or More Per Pound in United States Trade With Venezuela—1939 (Continued)*

[Group 1—Commodities valued from $0.50 to $0.99 per pound]

Class No.	Commodity	Shipping weight	Value	Value per pound	Density
		(*Pounds*)			
	Exports—continued				
9820	Manufactures of all other compounds of cellulose [2]	4,676	$3,502	$0.75	[1]
9826.1	Household brushes	10,806	6,131	0.57	13
9870	Coin operated phonographs	4,224	2,439	0.58	17–24
9872	"Other" coil operated machines except musical	520	382	0.73	17–24
	Total	6,644,220	$4,487,015	$0.68	
	Imports				
1718.1	Cordials, liqueurs, kirschwasser and ratafia	706	$470	$0.67	27–52
679.99	Metal manufacturers, "other," not plated with platinum, gold or silver [3]	58	50	0.86	[1]
	Total	764	$520	$0.68	

See footnotes at end of tables.

[Group 2—Commodities valued from $1.00 to $1.99 per pound)

	Exports				
0049	Sausage casings, other than beef and hog	4,530	$6,752	$1.49	52
0094	Meat extracts and bouillon cubes	31	46	1.48	34–57
	Upper leather except patent:				
0304	Calf and kip, black	51,458	95,621	1.86	av. 18
0308	Goat and glazed kid, black	16,225	32,103	1.98	av. 21
0309	Goat and glazed kid, other than black	107,170	135,257	1.26	av. 21
0312.1	Patent upper leather, cattle	44,815	49,112	1.10	10
0330	Belting, leather	296	372	1.26	43
0336	Glove and garment leather, sheep and lamb	166	168	1.01	19
0353	Upholstery and automobile leather	2,214	2,243	1.01	24
0647	Women's and misses' boots and shoes with leather uppers	5,261	8,460	1.61	11
0650	Slippers for housewear, all leather	1,087	1,303	1.20	9
0672	Leather gloves and mittens	4,786	7,117	1.49	12–28
0680	Leather belting, new	36,162	44,500	1.23	37
0688	Women's and children's handbags, pocketbooks and purses, leather	737	853	1.16	9
0692	Cardcases, change purses, wallets, and similar articles of leather	2,438	4,147	1.70	9
0698.9	Leather wearing apparel	9,162	14,237	1.55	8
0929	Feathers, dressed, and manufactures of feathers	2,062	2,227	1.08	6–29
2039	Rubber gloves and mittens	2,116	2,963	1.40	12
2047	Bathing caps	357	639	1.79	8
2095	Rubber thread	445	629	1.41	34
	Essential or distilled oils:				
2271	Citrus	1,303	1,474	1.13	21–42
2279	Other	13,359	16,242	1.22	21–42
2467	Flower seeds	1,724	2,152	1.25	27
2620	Tobacco manufactures, cigars and cheroots	211	348	1.65	av. 23
	Cotton:				
3020	Tire fabrics, unbleached gray cord	68	69	1.01	25
3037	Printcloth, yarn fabric construction, unbleached (above 32 x 36 count)	106	113	1.07	av. 34
3050	Checsecloth and gauze, bleached or dyed (full pieces)	211	408	1.93	17
3084	Tapestries and other upholstery goods	3,565	3,663	1.03	13–21
3090	Handkerchiefs	4,003	4,968	1.24	av. 15
3091.1	Work gloves, mits and gauntlets—fabric	15,818	16,759	1.06	av. 13
	Cotton knit goods:				
3093	Children's hosiery	1,290	2,147	1.66	av. 13
3096	Men's and boy's underwear	3,676	3,890	1.06	av. 12
3097	Women's and children's underwear	2,790	3,556	1.27	11
3099.5	Women's and children's sweaters, shawls and mufflers	266	383	1.44	7
	Cotton wearing apparel, not knit:				
3115	Men's nightwear	2,526	2,662	1.05	7
3116.1	Men's athletic underwear	832	1,290	1.55	13
3117.2	"Other" men's and boy's shirts	9,171	12,709	1.39	10
3120	"Other" men's and boy's clothing of woven fabrics [2]	4,745	9,450	1.99	22
3122	Women's dresses and ensembles	7,059	9,660	1.37	av. 11
3124	Women's and children's underwear and nightwear	2,300	3,062	1.33	13
3127	Children's outerwear	3,090	5,521	1.79	22
3129	"Other" women's and children's apparel of woven fabrics [2]	7,312	8,884	1.22	22
3175	Cotton bed spreads, candlewick, chenile and tufted	417	444	1.06	av. 14
3633	Wool yarns	737	1,426	1.93	13
3642	Wool cloth and dress goods	1,500	2,457	1.64	av. 16
3643	Mohair cloth	1,790	2,999	1.68	12
3662	Carpet and rugs of wool	2,270	3,942	1.74	av. 13
3665	Wool felts	333	358	1.08	av. 18
3679	Wool knit goods	2,774	2,940	1.06	10
3681	Wool clothing, women's and children's	2,512	4,005	1.59	16
3689	Wool or mohair manufactures, "other"	5,376	5,699	1.06	[1]
3720	Fabrics wholly or chiefly silk. Broad silks	4,517	7,215	1.60	22
3741	Silk underwear	706	1,349	1.91	8–16
3757	Men's silk socks	11,759	23,256	1.98	av. 12
	Rayon and other synthetic textiles:				
3845	Piece goods, pile, velvet, etc.	15,198	20,487	1.35	21
3849.1	"Other" woven fabric	127,674	156,927	1.23	31
3854	Women's and children's hosiery	3,980	6,395	1.61	av. 13
3856	Men's socks	1,720	3,250	1.89	av. 13
3858.1	Ribbons	679	976	1.44	12
3859	"Other" synthetic textile manufactures	2,924	3,439	1.18	[1]
3918	Waterproof outer garments	8,094	9,833	1.21	av. 12
	Hats and hat bodies of straw, palm leaf, etc.:				
3942	Harvest	289	376	1.30	10
3944	"Other," sewed	2,913	3,159	1.08	3–6
3945	"Other," woven	1,944	3,008	1.55	3–6
3953	Wool-felt hats	1,883	2,644	1.91	3–6
3958	Other hats, caps and berets of woven fabric	5,011	6,776	1.35	3–6
3963	Artificial or ornamental flowers, fruits, vegetables, etc.	1,162	1,232	1.06	3–6
3980	Absorbent cotton, gauze, and sterilized bandages	103,541	128,391	1.24	av. 12
3994	Garters, armbands, suspenders, braces	10,067	10,530	1.05	av. 17
5217	Laminated glass and manufactures	843	1,031	1.22	64–80
5455.1	Asbestos textiles and yarn	14	20	1.43	24–36
5513	Mica. Manufactures other than ground or pulverized	388	498	1.28	av. 64
5990	Precious, synthetic and imitation stones including pearls	2,304	3,746	1.70	[1]
6114	Scissors, shears and snips	823	1,275	1.55	44
6115	Table cutlery including forks	5,421	6,609	1.22	30

Digitized by Google

TABLE 7.—*Commodities Valued at $0.50 or More Per Pound in United States Trade With Venezuela—1939 (Continued)*

[Group 2—Commodities valued from $1.00 to $1.99 per pound]

Class No.	Commodity	Shipping weight	Value	Value per pound	Density
		(*Pounds*)			
	Exports—continued				
6154	Hacksaw blades	8,434	$14,808	$1.76	135
6167	Drills, reamers and countersinks, metal cutting	9,249	16,038	1.73	30–65
6172	Slip joint pliers	273	493	1.80	49–90
6179	Padlocks of iron, steel, brass and bronze	10,878	13,761	1.26	54–96
6181	Cabinet and other locks of iron, steel, brass and bronze	902	1,190	1.32	21
6630	Nickel chrome electric resistance wire	93	94	1.01	50
6635	Quicksilver or mercury	1,527	1,883	1.23	172–800
7036	Electrical indicating instruments	3,993	7,160	1.79	5–17
7038	"Other" electrical testing apparatus and parts	11,234	11,313	1.01	[1]
7063	Electric incandescent lamps, for autos, flashlights and Christmas trees	13,735	20,026	1.46	5–12
7068.1	Electric household washing machines	19,982	35,648	1.78	13
7075.9	Therapeutic apparatus and parts (other than X-ray)	20,371	22,673	1.11	[1]
	Radio equipment:				
7077	Receiving sets	358,661	449,761	1.25	7–29
7079	Receiving set components	43,435	64,154	1.48	11–36
7081	"Other" accessories	8,346	15,440	1.85	[1]
7082	Telegraph apparatus and parts	6,020	8,295	1.38	24
	Telephone equipment:				
7083	Instruments	2,418	4,555	1.88	50
7087	"Other" equipment and parts	105,900	109,395	1.03	10–60
7159	Internal combustion engine accessories and parts	166,256	168,584	1.01	av. 45
7457	Pneumatic portable tools	7,872	8,423	1.07	24–140
7485	Metal working machinery, tools, and parts; "other"	5,462	7,232	1.32	15–69
7553	Sewing machine parts	18,731	32,966	1.76	39
7644	Bottling, bottle washing and bottle labeling machinery and parts	116,211	130,004	1.12	8–127
7759	Card punching, sorting and tabulating machines	33,840	52,588	1.55	16
7761	Accounting and calculating machines and parts	2,348	3,292	1.40	23
7764	Cash registers, new	47,363	59,346	1.25	17–31
7775	Typewriter parts	3,827	4,443	1.16	22
7779	Office appliances and parts, "other"	38,549	43,445	1.13	[1]
7959	Internal combustion marine engines, other than Diesel or outboard	49,172	58,810	1.20	22–30
8025	Coal tar intermediates, "other"	1	1	1.00	19–59
8119	Vitamines and vitasterols	1,426	2,319	1.63	[1]
8127	Tablets, pills, capsules, powders, ointments and similar manufactures	138,952	142,704	1.03	25
8155	Asthma, catarrh, and hay fever preparations, including inhalents	15,074	15,873	1.05	30–45
8167	Headache, neuralgia and pain remedies	11,842	13,547	1.14	30–45
8250	Metal working compounds	15,355	15,441	1.01	65
8755	Rouges	8,030	9,724	1.21	30
9005	Cameras, other than motion picture	2,859	3,863	1.35	40
9010	Motion picture recording equipment	11,493	17,011	1.48	[1]
9115	Motion picture film, positive, 1 in. or more wide, unexposed	1,657	2,722	1.64	av. 40
9125	Sensitized film, cartridge or rolls, unexposed	20,095	23,764	1.18	26
9126.9	Packs of unexposed film sheets, other than X-ray	4,791	6,718	1.40	23–41
9143	Spectacles, eye glasses, goggles, lenses [2] and frames	18,965	26,248	1.38	11–41
9157	Surgical and medical instruments	17,636	23,191	1.32	21
9160	Surveying and engineering instruments	40,476	52,943	1.31	18–33
9190	"Other" scientific laboratory and professional instruments and apparatus	171,689	184,737	1.08	3–87
9293	String instruments	360	678	1.88	2–6
9392	Carbon paper	23,063	29,226	1.27	36
9395	Typewriter ribbons	6,525	11,997	1.84	47
9491	Metallic cartridges	1,870	2,505	1.34	130
9579	Clocks and parts, "other"	1,059	1,399	1.32	17–48
9629	Jewelry. Other articles of other materials	300	504	1.68	[1]
9713	Button parts, backs, blanks or molds	3,650	4,481	1.23	6–38
9791	Incandescent mantels	3,368	4,190	1.24	9
9809	Synthetic resin. Cast sheets, plates, rods, tubes and other unfinished forms	25	25	1.00	[1]
9812	Synthetic resin, molded products	230	306	1.33	[1]
9824	Toilet brushes other than tooth brushes	1,578	2,015	1.28	5–16
9825	Paint brushes except industrial	5,932	11,545	1.95	25
9826.9	Brushes. "Other," including industrial	3,979	7,225	1.82	29
9827	Combs	633	684	1.08	24
9830	Plates and cuts, electrotype, stereotype, halftone, lithographic or engraved	1,275	1,489	1.17	[1]
9831	Umbrellas and parasols	1,123	1,628	1.45	av. 26
	Total	2,348,999	$2,931,374	$1.25	
	Imports				
0295.0	Reptile skins, raw	10,902	$17,243	$1.76	17
1546.0	Spices. Tonka beans	22,703	43,497	1.30	25–32
2559.3	Grafted or budded plants, cuttings, seedlings or ornamental trees, vines and all nursery or greenhouse stock [3]	[1]	16	1.00	[1]
2945.1	Cut flowers, dried, prepared or preserved	96	120	1.25	6–20
9022.3	Motion picture film, exposed, negative news reels	63	99	1.57	av. 40
	Total	33,764	$60,975	$1.81	

See footnotes at end of tables

[Group 3—Commodities values from $2.00 to $2.99 per pound]

	Exports				
0758	Fur waste, fur pieces and damaged skin	91	$272	$2.99	14
0759	Other fur manufactures	256	650	2.54	4–6
2058	Combs, finished hard rubber	949	2,111	2.22	24
2268	Essential or distilled oil, peppermint	57	121	2.12	21–42
2280	Blended, compounded, or mixed perfume flavor oils	14,449	36,238	2.51	21–42
3088	Cotton pile fabrics, other than plushes and tapestries	187	388	2.07	10–21
	Cotton knit hosiery:				
3093	Women's	1,045	2,541	2.43	av. 18
3095	Men's	3,124	6,334	2.03	av. 15
3185	Cotton laces, embroideries and lace window curtains	872	1,942	2.23	8
3719	Sewing embroidery and crochet silk	38	111	2.92	19
3848	Rayon and other synthetic knit fabric in the piece	147	318	2.16	4
3853.2	Rayon knit outerwear	67	162	2.42	10
3921	Corsets, brassieres, girdles	11,390	31,763	2.79	av. 12
3952	Women's and girls' fur felt hats	39	104	2.67	3–6
6112	Razors, safety	5,632	12,366	2.20	38
7037	Electrical recording instruments	1,514	3,961	2.62	25
7076	Radio transmitting sets, tubes and parts	53,668	122,899	2.29	9–36
7078	Radio receiving tubes	13,160	26,386	2.00	9

Digitized by Google

TABLE 7.—*Commodities Valued at $0.50 or More Per Pound in United States Trade With Venezuela—1939 (Continued)*

[Group 3—Commodities valued from $2.00 to $2.99 per pound]

Class No.	Commodity	Shipping weight	Value	Value per pound	Density
		(*Pounds*)			
	Exports—continued				
	Accounting and calculating machines:				
7752	Listing, adding, bookkeeping machines	6,189	$15,156	$2.45	av. 20
7753	Typewriter, bookkeeping, billing machines	3,591	8,209	2.28	av. 15
7756	Listing adding machines	21,928	46,750	2.13	av. 20
7757	Calculators	12,168	35,251	2.90	av. 19
8122	Vaccines for human use	11,050	31,746	2.87	[1]
8123	Glandular products, organotherapeutics, enzymes and ferments and culture media	15,791	34,678	2.20	[1]
8157	Malaria, chill and fever remedies	1,470	3,194	2.17	30–45
8756	Lipsticks	10,957	21,871	2.00	30
9008.2	Motion picture projectors, substandard gauge (less 35 mm.), sound	595	1,544	2.59	14
9121.5	Exposed newsreel films, negative (less than 4,000 lin. ft.)	142	340	2.39	av. 40
9123.1	Exposed feature films, positive (4,000 lin. ft. or over)	27,730	81,868	2.95	av. 40
9126.1	X-ray films, packs of sheets	5,881	14,966	2.54	23
9158	Surgical appliances, artificial limbs, trusses, crutches, etc	9,439	20,719	2.20	4–60
9315	Metallic pen points	1,232	3,199	2.60	39–45
9420	Fishing rods	175	391	2.23	14–23
9433	Golf balls	1,351	2,873	2.13	18–33
9436	Golf clubs	645	1,455	2.26	[1]
9610	Paintings, etchings, engravings, statuary	1,186	2,522	2.13	[1]
	Jewelry:				
9626	"Other" articles of metal (not gold or platinum)	3,927	10,878	2.77	[1]
9627	Of materials other than metals. Men's	6	17	2.83	[1]
9628	Of materials other than metals. Women's	1,422	4,165	2.93	[1]
9712	Buttons of materials other than plastics	1,855	5,210	2.81	6–38
9828	Tobacco pipes of all materials	102	215	2.11	13
	Total	245,517	$595,884	$2.43	
	Imports				
0862.3	Live birds. Song birds $5 or less in value	600	$1,199	$2.00	[1]
0862.5	Birds [2], $5 or less in value	240	481	2.00	[1]
8140.5	Chemical preparations in capsules, pills, etc	2	5	2.50	av. 25
8150.1	Medicinal preparations [3], not containing alcohol	2	5	2.50	av. 50
	Total	844	$1,690	$2.00	

See footnotes at end of tables.

[Group 4—Commodities valued from $3.00 to $3.99 per pound]

	Exports				
3680	Wool, men's and boys' overcoats, suits and pants	561	$2,067	$3.68	av. 17
3711	Spun silk	150	539	3.59	19
3729	Silk and velvet ribbons	172	555	3.23	12
3755	Silk hosiery, women's full fashioned	27,101	108,246	3.99	av. 11
3759	"Other" silk wearing apparel	32	107	3.34	10
3852	Rayon and other synthetic dresses, skirts, blouses, and other outerwear not knit or crocheted	10,020	31,988	3.19	10
3857.7	Rayon or synthetic sleeping and lounging garments knit or woven	179	688	3.84	8–14
6118	Machine knives	261	803	3.08	174
6168	Hand operated screw plates, bolt dies, taps and tap wrenches	2,174	7,194	3.31	53–120
6230	Tungsten metal wire, shapes, and alloys	3,875	11,918	3.08	49
7075.1	X-ray tubes	1,744	6,762	3.88	[1]
7099.1	Electric razors	694	2,209	3.18	16
8121	Serums and anti-toxins for human use	10,614	38,732	3.65	[1]
9001	Motion picture cameras, substandard gauge (less than 35 mm.)	773	2,796	3.62	36
9112	Stereopticons, magic lanterns and other projection apparatus	2,807	9,763	3.48	[1]
9123.5	Newsreel positive exposed film (less than 4,000 lin. ft.)	2,007	6,355	3.17	av. 4
9149	"Other" optical goods	2,774	8,931	3.22	[1]
9150	Dental instruments	127	473	3.72	13–20
9247	Brass wind instruments	167	588	3.52	6–14
9302	Mechanical pencils of materials other than plastic	598	2,056	3.44	17–30
9580	Watches without jewels	4,750	16,494	3.47	46
9635	Jewelry findings, parts and materials	341	1,233	3.62	[1]
9711	Buttons and parts of cellulose compounds, galalith, and other plastics	2,074	6,954	3.35	6–38
	Total	73,995	$267,451	$3.61	

[Group 5—Commodities valued from $4.00 to $4.99 per pound]

	Exports				
0693	Card cases, change purses, wallets and similar articles or materials other than leather	109	$461	$4.23	9
3799	"Other" silk manufactures	140	576	4.11	8
3857.2	Rayon or synthetic woven underwear	446	1,789	4.01	av. 12
6197	Precision scales, balances and weights for laboratory use	283	1,307	4.62	av. 18
6249	Metals and alloys in primary forms used in the manufacture of iron and steel	105	450	4.29	[1]
6465	Hinges and butts of brass or bronze	489	2,120	4.34	48–90
6955	Sterling and other solid silver ware knives, forks and steak sets	38	183	4.82	17–43
6956	Sterling and other solid silver ware; other	358	1,718	4.80	17–43
7482	Machine operated metal cutting tools. Millers, cutters, threading dies and taps, etc	489	2,427	4.96	15–69
9007	Motion picture projectors, standard gauge 35 mm	2,267	9,852	4.34	av. 11
9121.1	Exposed motion picture films. Negative features (4,000 lin. ft. or over)	201	803	4.00	av. 40
9421	Fishing reels	105	466	4.44	[1]
9822	Tooth brushes	12,046	49,696	4.13	14
	Total	17,076	$71,848	$4.21	

See footnotes at end of tables

Digitized by Google

TABLE 7.—*Commodities Valued at $0.50 or More Per Pound in United States Trade With Venezuela—1939 (Continued)*

[Group 6—Commodities valued from $5.00 to $9.99 per pound]

Class No.	Commodity	Shipping weight	Value	Value per pound	Density
		(*Pounds*)			
	Exports				
0357	Reptilian and aquatic leather for all purposes	15	$136	$9.07	18–30
3091.2	Cotton dress gloves and other	102	548	5.37	av. 11
3742	Silk dresses, skirts and blouses	244	1,337	5.58	10
3754	Silk seamless hosiery, women's and children's	5,171	27,659	5.35	av. 11
3853.1	Rayon or synthetic knit or crochet dresses and ensembles	25	127	5.08	10
3928	Neckties, cravats, mufflers, and scarfs of all fibers	4,590	23,832	5.19	av. 22
3951	Men's and boys' fur felt hats	3,355	20,951	6.25	3–6
6189	Sewing machine needles	1,274	11,016	8.65	37
8629	Blasting caps	3,248	19,650	6.05	36
	Cameras:				
9000	Motion picture, standard gauge	272	1,551	5.70	36
9006	Parts, except lenses	491	2,934	5.98	[1]
	Motion picture film:				
9113	Unexposed, positive; less than 1 inch wide	279	1,949	6.99	av. 40
9114	Unexposed, negative; less than 1 inch wide	1,022	9,749	9.54	av. 40
9116	Unexposed, negative; 1 inch or more wide	982	6,161	6.27	av. 40
9121.9	Exposed, negative, other than newsreels	28	147	5.25	av. 40
9123.9	Exposed, positive; other than newsreels and features	2,677	15,071	5.63	av. 40
9142	Opthalmic lenses	153	1,158	7.57	9–29
9248	Woodwind instruments	103	763	7.41	6–27
9301	Mechanical pencils of plastic materials	590	4,618	7.83	17–30
9310	Pens, fountain and stylographic. Materials other than plastic	325	2,033	6.26	8–28
9312	Pen parts	774	5,916	7.64	8–42
9470	Revolvers and pistols	3,404	20,904	6.14	av. 12
	Jewelry of metals other than gold or platinum:				
9621	Men's	1,272	6,908	5.43	[1]
9623	Women's	2,509	18,143	7.23	[1]
	Total	32,905	$203,261	$6.18	
	Imports				
0862.6	Birds [3], valued $5.00 or over	5	$25	$5.00	[1]
2559.2	Orchid plants	6,129	31,793	5.18	6
	Total	6,134	$31,818	$5.19	

See footnotes at end of tables.

[Group 7—Commodities valued from $10.00 to $24.99 per pound]

	Exports				
0753	Fur wearing apparel	69	$1,290	$18.70	4–6
6997	Gold manufactures [2]	321	5,533	17.25	[1]
9002.3	Cameras. Aerial, studio, photo engraving, coin operated, and similar types for commercial, professional and scientific uses	642	7,476	11.64	17–40
9147	Optical lenses not fitted to instruments	30	518	17.27	45
9152	Teeth	310	5,590	18.03	[1]
9309	Pens, fountain and stylographic of plastic materials	1,554	32,051	20.62	15
9589	Watch parts	17	203	11.94	25–66
	Total	2,943	$52,661	$17.89	
	Imports				
0720	Furs, undressed, otter	8	$97	$12.12	
9503.4	Manuscripts [3]	2	25	12.50	[1]
	Total	10	$122	$12.20	17

See footnotes at end of tables.

[Group 8—Commodities valued over $25.00 per pound]

	Exports				
6190	Needles, other than sewing machine	111	$3,065	$27.61	37
6922	Platinum and allied metals. Ingots, sheets, alloys and scrap	10	570	57.00	[1]
9154	Dental gold and precious metal alloys for dental purposes	275	13,060	47.56	[1]
9581	Watches with jewels	44	2,767	62.89	46
9620	Jewelry of solid gold or platinum	114	9,915	87.03	[1]
	Total	554	$29,377	$53.03	
	Imports				
0728.5	Furs, undressed, wildcat	1	$25	$25.00	17
9503.6	Stamps, foreign postage or revenue and foreign government stamped envelope or postcard	16	1,175	73.44	[1]
9022.5	Motion picture film. Exposed, negative shorts other than newsreels	1	150	[4] 150.00	av. 40
	Total	18	$1,350	$75.00	

[1] Not available.

[2] Not elsewhere specified.

[3] Not specially provided for.

[4] The customary value per pound for such films is $1.00–$10.00. This item appears to be a private reel overvalued by the owner for personal reasons.

Source: *Foreign Commerce and Navigation of the United States, calendar year, 1939*, U. S. Department of Commerce.

Digitized by Google

TABLE 8.—*Perishable Commodities in United States Trade With Venezuela—1939*

[Category 2]

Class No.	Commodity	Shipping weight	Value	Value per pound	Density
		(*Pounds*)			
	Exports				
	Cattle:				
0010	For breeding	225,348	$75,386	$0.33	[1]
0012	"Other"	4,380	1,875	0.43	[1]
0013	Hogs, swine	4,140	1,333	0.32	[1]
0016	Sheep	5,500	1,375	0.25	[1]
0019	Poultry, live	13,287	8,259	0.62	[1]
0020	Beef and veal—fresh or frozen	18,196	2,553	0.14	25–50
0027	Pork—fresh or frozen	21,439	4,530	0.21	25–36
0040	Poultry and game, fresh	69,802	21,646	0.31	[1]
0053	Lard	13,068,162	908,503	0.07	av. 36
0060	Milk and cream, fresh and sterilized	3,358	1,031	0.31	47
0065	Butter	160,754	46,986	0.29	37
0070	Fresh salmon	1,511	204	0.14	38–52
0071	Fish, fresh, "other"	1,958	307	0.16	38–52
0072	Oysters, fresh, in the shell, shucked, frozen or ice	12,164	1,082	0.09	[1]
0074	Shrimp, fresh, frozen or in ice	1,376	187	0.14	[1]
0092	[2] Eggs, in the shell	27,549	5,505	0.20	24
0900	Horses for breeding	1,558	400	0.26	[1]
0901	Horses, "other"	2,054	780	0.38	[1]
0909	Live animals, "other"	32,351	9,964	0.31	[1]
	Fresh vegetables:				
1207	Beans	44,614	2,293	0.05	19–48
1209	Green peas	38,226	1,985	0.05	15–23
1210	Peppers	616	33	0.05	14–23
1213	Tomatoes	7,299	639	0.09	29–36
1224	"Other"	660,333	15,848	0.02	14–48
1256	Yeast	273,508	32,733	0.13	22
	Fresh fruit:				
1302	Grapefruit	4,130	151	0.04	34–43
1303	Lemons	2,580	138	0.05	30–44
1305	Oranges	30,099	1,730	0.06	34–43
1309	Cherries	11,997	1,420	0.12	23–42
1313	Berries	7,462	982	0.13	14–34
1314.5	Melons (other than watermelon)	7,791	501	0.06	31–40
1315	Grapes	509,498	54,957	0.11	24–40
1316	Pears	425,501	25,135	0.06	35–39
1317	Peaches	19,716	1,611	0.08	32–37
1318	Prunes and plums	98,067	8,416	0.09	33
1319.1	Apricots	4,092	345	0.08	33
1319.9	Other fresh fruits	52,650	1,053	0.02	24–40
2535	[2] Flowers and foliage, fresh, cut and preserved	651	151	0.23	20
2599	[2] All other nursery and greenhouse stock	111,975	9,070	0.08	16
2620	Cigars and cheroots	211	348	1.65	av. 23
8120	Biologics, for animal and veterinary use	25,176	22,230	0.88	[1]
8121	Serums and anti-toxins for human use	10,614	38,732	3.65	[1]
8122	Vaccines for human use	11,050	31,746	2.87	[1]
8123	Glandular products, organotherapeutics, enzymes, ferments and culture media	15,791	34,678	2.20	[1]
	Total	16,048,534	$1,378,831	$0.08	
	Total valued $0.50 or more per pound	76,129	$135,993	$1.79	
	Total valued less than $0.50 per pound	15,972,405	$1,242,838	$0.08	
	Imports				
0862.3	Live birds [3]. Song birds $5 or less value	600	$1,199	$2.00	[1]
0862.5	Birds [4], valued $5 or less	240	481	2.00	[1]
0862.6	Birds [4], valued over $5	5	25	5.00	[1]
0906.9	Live animals [4]	[1]	54	[1]	[1]
1301.0	Bananas, green or ripe	4,261,050	67,480	0.02	18
2559.2	[2] Orchid plants	6,129	31,793	5.18	6
	Total	[5] 4,268,024	$101,032	$0.02	
	Total valued $0.50 or more per pound	6,974	$33,498	$4.80	
	Total valued less than $0.50 per pound	4,261,050	$67,534	$0.02	

[1] Not available.

[2] Item also included in fragile list.

[3] Not elsewhere specified.

[4] Not specially provided for.

[5] Does not include any amount for "live animals, n.s.p.f." However, this does not affect the total significantly.

Source: *Foreign Commerce and Navigation of the United States, calendar year, 1939*, U. S. Department of Commerce.

Digitized by Google

TABLE 9.—*Fragile Commodities in United States Trade With Venezuela—1939*

[Category 3]

Class No.	Commodity	Shipping weight	Value	Value per pound	Density
		(*Pounds*)			
	Exports				
0092	[1] Eggs, in the shell	27,549	$5,505	$0.20	24
2535	[1] Flowers and foilage, fresh cut and preserved	651	151	0.23	20
2599	[1] All other nursery and greenhouse stock	111,975	9,070	0.08	16
3963	Artificial or ornamental flowers, fruits, vegetables, etc	1,162	1,232	1.06	3–6
	Glass:				
5212	Plate	80,592	5,815	0.07	64–80
5215	Cylinder, crown and sheet	49,249	3,700	0.08	45–100
5217	Laminated and manufactures	843	1,031	1.22	64–80
5218	Rolled	80,983	6,360	0.08	30–60
5220	Rolled, cylinder, crown, and sheet; obscured by coloring prior to solidification, not less than ¼ in. thick	3,043	830	0.27	30–100
5230	"Other"	35,617	7,977	0.22	[2]
5232	Unfilled glass containers. Pharmaceutical and proprietary ware	1,420,891	78,149	0.05	11–26
5234	Beverage bottles, including soda, beer, and alcoholic beverage bottles	3,653,895	69,424	0.02	22–30
5235	Used glass containers of all types	72,122	2,957	0.04	22–30
5236	"Other" unfilled glass containers	998,976	40,958	0.04	22–30
5237	Tumblers, drinking glasses and stem ware, plain, cut, or engraved	297,379	15,761	0.05	12–25
5239	Table glass ware [3], plain, cut or engraved	582,463	31,453	0.05	12–30
5255	Lamp chimneys and lantern globes	18,074	2,440	0.14	3–9
5261	Globes and shades for lighting fixtures	66,629	8,262	0.12	3–9
5291	Chemical glass ware	18,698	12,967	0.69	6–9
5292	Glass electric insulators	207,632	12,407	0.06	30
5299	"Other" glassware	214,644	21,679	0.10	[2]
5320	Pottery. Table and kitchen articles and utensils	24,103	4,716	0.19	12–36
6197	Precision scales, balances and weights for laboratory use	283	1,307	4.62	av. 18
7035	Watt hour and other measuring meters	10,506	8,477	0.85	37–64
7036	Electrical indicating instruments	3,993	7,160	1.79	5–17
7037	Electrical recording instruments	1,514	3,961	2.62	25
7038	"Other" electrical testing apparatus and parts	11,234	11,313	1.01	[2]
7063	Electrical incandescent lamps for autos, flashlights and Christmas trees	13,735	20,026	1.46	5–12
7064	"Other" metal filament lamps	77,864	52,480	0.67	5–12
7065	"Other" electric lamps	9,394	4,697	0.50	4–12
7067	Floodlights	24,703	9,980	0.40	8–15
7075.1	X-ray tubes	1,744	6,762	3.88	2
7075.5	Other X-ray apparatus and parts	105,371	82,611	0.78	14–60
7075.9	Other therapeutic apparatus and parts	20,371	22,673	1.11	[2]
	Radio apparatus:				
7076	Transmitting sets, tubes and parts	53,668	122,899	2.29	9–36
7077	Receiving sets	358,661	449,761	1.25	7–29
7078	Receiving tubes	13,160	26,386	2.00	9
7079	Receiving set components	43,435	64,154	1.48	11–36
7081	Receiving set accessories (other than loud speakers)	8,346	15,440	1.85	[2]
7082	Telegraph apparatus and parts	6,020	8,295	1.38	24
7083	Telephone apparatus—instruments	2,418	4,555	1.88	50
7099.1	Electric razors	694	2,209	3.18	16
	Accounting and calculating machines:				
7752	Listing, adding, bookkeeping machines	6,189	15,156	2.45	16–24
7753	Typewriter, bookkeeping, billing machines	3,591	8,209	2.29	15–20
7756	Listing, adding machines	21,928	46,750	2.13	16–34
7757	Calculating machines	12,168	35,251	2.90	16–23
	Cash registers:				
7764	New	47,363	59,346	1.25	17–31
7766	Used and rebuilt	27,195	9,192	0.34	17–31
7767	Parts	3,126	3,042	0.97	23
	Typewriters:				
7770	Standard new	120,636	100,007	0.83	av. 19
7772	Portable new	74,280	60,687	0.82	av. 24
7774.1	Rebuilt	26,470	14,876	0.56	20
7774.9	"Other," used	1,142	717	0.63	20
	Explosives:				
8601	Smokeless powder	2,009	1,259	0.63	53
8604	Dynamite	1,049,623	158,667	0.15	48
8609	"Other"	207,240	20,673	0.10	30–53
8625	Safety fuses	42,011	10,305	0.25	22–28
8629	Blasting caps	3,248	19,650	6.05	36
	Motion picture cameras:				
9000	Standard gauge	272	1,551	5.70	36
9001	Substandard gauge	773	2,796	3.62	36
	Cameras:				
9002.3	Aerial, studio, photo-engraving, coin operated, etc	642	7,476	11.64	17–40
9003	Box type, set focus	3,322	2,558	0.77	17–40
9005	"Other"	2,859	3,863	1.35	40
9006	Parts, except lenses	491	2,934	5.98	[2]
	Motion picture projectors:				
9007	Standard gauge	2,267	9,852	4.34	8–14
9008–1	Substandard gauge, silent	3,122	1,817	0.58	20–28
9008.2	Substandard gauge, sound	595	1,544	2.59	14
	Motion picture sound equipment:				
9010	Recording	11,493	17,011	1.48	[2]
9011	Reproducing	27,121	25,412	0.94	6–23
9142	Opthalmic lenses	153	1,158	7.57	9–29
9143	Spectacles, eyeglasses, goggles, lenses [3] and frames	18,965	26,248	1.38	11–41
9147	Lenses not fitted to instruments	30	518	17.27	45
9149	"Other" optical goods	2,774	8,931	3.22	[2]
9160	Surveying and engineering instruments	40,476	52,943	1.31	18–33
9190	"Other" scientific, laboratory and professional instruments and apparatus	171,689	184,737	1.08	3–87
9242	[4] Phonograph records	83,807	32,182	0.38	40
9293	String instruments	360	678	1.88	2–6
	Clocks:				
9570	Electric	4,388	2,574	0.59	16
9571	1-day alarms	26,714	24,913	0.93	26–40
9572	Mantel, novelty and wall	9,973	2,874	0.29	26–40
9579	"Other" and parts	1,059	1,399	1.32	17–48
	Watches:				
9580	Without jewels	4,750	16,494	3.47	46
9581	Wtih jewels	44	2,767	62.89	46
9589	Parts	17	203	11.94	25–66
9591	Time recording devices and parts	12,718	9,920	0.78	[2]
9610	Paintings, etchings, engravings and statuary	1,186	2,522	2.13	[2]
9791	Incandescent mantels	3,368	4,190	1.24	9
9792	Lanterns, wick	38,309	12,669	0.33	9–16

Digitized by Google

TABLE 9.—*Fragile Commodities in United States Trade With Venezuela—1939 (Continued)*

[Category 3]

Class No.	Commodity	Shipping weight	Value	Value per pound	Density
		(*Pounds*)			
	Exports—continued				
9793	Gasoline pressure lamps, lanterns and parts	29,243	16,230	0.56	9–
9794	"Other" lamps except electric	25,647	13,034	0.51	3–17
9832	Candles	842	162	0.20	23–22
					41
	Total	10,911,972	$2,325,937	$0.21	
	Total valued $0.50 or more per pound	1,481,802	$1,741,619	$1.18	
	Total valued less than $0.50 per pound	9,430,170	$584,318	$0.06	
	Imports				
2559.2	[1] Orchid plants	6,129	$31,793	$5.18	
2559.3	Grafted or budded plants, cuttings and seedlings of ornamental tree shrubs, vines, and all nursery or greenhouse stock	[2]	16	[2]	[2] 6
	Total	6,129	$31,809	$5.19	

[1] Item also included in perishable list.
[2] Not available.
[3] Not elsewhere specified.
[4] Item also included in style factor list.
Source: *Foreign Commerce and Navigation of the United States, calendar year, 1939*, U. S. Department of Commerce

TABLE 10.—*Style Factor Commodities in United States Trade With Venezuela—1939*

[Category 4]

Class No.	Commodity	Shipping weight	Value	Value per pound	Density
		(*Pounds*)			
	Exports				
0647	Women's and misses' boots and shoes of leather uppers	5,261	$8,460	$1.61	11
	Women's and children's handbags, pocketbooks and purses:				
0688	Leather	737	853	1.16	9
0689	Materials other than leather	27,500	19,382	0.70	9
0753	Fur wearing apparel	69	1,290	18.70	6
3122	Cotton women's and Children's dresses and ensembles	7,059	9,660	1.37	av. 11
3675	Wool knit bathing suits	32,102	11,090	0.35	10
3681	Wool clothing, women's and children's	2,512	4,005	1.59	16
	Silk wearing apparel:				
3742	Dresses, skirts and blouses	244	1,337	5.58	10
3759	"Other"	32	107	3.34	8–10
3799	Silk manufactures, "other"	140	576	4.11	8
	Rayon or synthetic textiles:				
3852	Dresses, skirts, blouses, and other outwear not knit or crocheted	10,020	31,988	3.19	10
3853.1	Knit or crochet dresses and ensembles	25	127	5.08	10
3853.2	"Other" knit outerwear	67	162	2.42	10
	Hats and hat bodies of straw, palm leaf, etc.:				
3944	Sewed, other than harvest	2,913	3,159	1.08	3–6
3945	"Other", woven	1,944	3,008	1.55	3–6
3952	Women's and girls' fur felt hats	39	104	2.67	3–6
	Exposed motion picture film:				
9121.1	Negative features (4,000 lin. ft. or over)	201	803	4.00	av. 40
9121.5	Negative newsreels (less than 4,000 lin. ft.)	142	340	2.39	av .40
9121.9	Negative, other (less than 4,000 lin. ft.)	28	147	5.25	av. 40
9123.1	Positive features (4,000 lin. ft. or over)	27,730	81,868	2.95	av. 40
9123.5	Positive newsreels (less than 4,000 lin. ft.)	2,007	6,355	3.17	av. 40
9123.9	Positive other (less than 4,000 lin. ft.)	2,677	15,071	5.63	av. 40
9242	[1] Phonograph records	83,807	32,182	0.38	40
9516	Catalogs and pamphlets	37,984	11,392	0.30	30–40
9523	Music in books and sheets	824	313	0.38	30–40
9560	Calendars, printed or unprinted, and advertising novelties	11,062	4,978	0.45	30–40
	Total	257,126	$248,757	$0.97	
	Total valued $0.50 or more per pound	91,347	$188,802	$2.07	
	Total valued less than $0.50 per pound	165,779	$59,955	$0.36	
	Imports				
9022.3	Motion picture films, negatives, exposed but not developed. Newsreels	63	$99	$1.57	av. 40
9022.5	"Other" exposed motion picture films	1	150	[2] 150.00	av. 40
	Total	64	$249	$3.89	

[1] Item also included in fragile list.
[2] See footnote 4 in table 7.
Source: *Foreign Commerce and Navigation of the United States, calendar year, 1939*, U. S. Department of Commerce.

Digitized by Google

Appendix

The volume of air cargo which will move between the United States and foreign countries after the war will depend upon a number of economic factors, such as the comparative speeds, costs, reliability, convenience, and quality of service of air carriers compared with surface carriers. A substantial part of air-cargo tonnage which is likely to move will consist of commodities which previously moved by steamship, while an unknown percentage of future air-cargo shipments will consist of new traffic, especially perishables, made possible by the much faster service offered by air carriers.

In initiating this series of studies, it is believed that an analysis of pre-war trade will furnish some indication of the specific commodities that may be diverted to air carriers in the post-war period. Since the year 1939 is the latest period during which United States trade with Latin America did not show the effects of war, it was decided to use the United States export and import statistics for that year as the basis for study. In studying the thousands of commodities which moved between the United States and Latin American countries, it was agreed that at least four basic factors are of major importance in determining which should be selected as offering the best prospects for transport by air. These are as follows: (1) Value per pound, (2) perishability, (3) fragility, and (4) style factor, including obsolescence.

It is recognized that no single one of these factors is necessarily of sufficient importance to justify the higher charges which will have to be made for air carriage in comparison with surface transport. It is also evident that a commodity which appears suitable for air carriage on the basis of only one factor is not likely to go by air as one which is suitable on the basis of two or more factors. For example, a commodity worth $5 per pound which is also perishable, fragile, or possessed of a style factor is more likely to go by air than a commodity equally valuable lacking any of these favorable characteristics.

In addition to the four major categories covered in this study there are others which merit investigation. Among these may be mentioned economies in packing, insurance, size of shipment, density, and various capital costs. Not all of these have been investigated here because the foreign trade statistics utilized did not lend themselves to such analyses. The experience of the Army and Navy air-transport services during the recent war has demonstrated that substantial packing economies are possible for almost all commodities flown. These economies for certain commodities have reached 70 percent of the total shipping weight, while the average reduction in shipping weight has been reported as approximately 30 percent. A special study of potential packing economies is planned for the commodities included under the four categories shown in this report.

In the past many commodities have been shipped by air to meet emergency situations with little consideration given to cost of service. It is clear that almost any commodity regardless of its economic characteristics may be sent by air under conditions of extreme emergency. Perishable pharmaceuticals and machine tools and parts are classes of commodities which have previously constituted important emergency shipments. Practically all of these are already included in this study because of their high value per pound. In addition to strictly emergency shipments, there will be shipments of odd items for the filling in of inventories where sudden or unexpected increases in demand result in shortages.

Categories Described

In deciding which categories should be included in the four categories adopted, the question of definition of terms immediately arose, especially in the case of categories 2, 3, and 4 which cover perishability, fragility, and style factor. The bases for selection are briefly described below:

1. Value Per Pound

In determining which commodities should be screened on the basis of value per pound it was necessary to decide first whether net weight or shipping weight should be used, then to decide upon the minimum value per pound, and finally, after a minimum value per pound had been chosen, into how many subclasses the commodities falling above this minimum should be divided.

Since the charges to the shipper are based on gross shipping weights, rather than net weights, it was concluded that such weights were the proper ones to use in an analysis of air-cargo potentials, and they will be used exclusively in each study of the series except the first. The first study covering trade between the United States and Brazil was begun at a time when an adequate body of data on gross shipping weights was not readily available. More recently such data have become available. In the United States-Brazil study, asteriks indicate where net weights are used.

After consultation with various commodity specialists it was decided that all commodities with a value of less than $0.50 per pound should be eliminated from the first category. It was felt that few commodities below that minimum would offer prospects for air carriage in the immediate post-war period. In fact, it is believed that many commodities above $0.50, particularly between $0.50 and $1, offer slight prospects for air-carriage unless additional factors, such as perishability, fragility, or style factor are also involved. A commodity worth $0.50 a pound has a value of $1,000 per ton. If it is assumed that the typical air-borne commodity moves 4,000 miles between the United States and South America and that the air-line charge is $0.15 per ton-mile, then the transportation charges on 1 ton would equal $600 or 60 percent of the value of the commodity. A commodity worth $3 a pound has a value of $6,000 per ton. On the basis of the assumptions just stated, air-cargo charges would amount to $600 or only 10 percent of the value of the commodity. These figures may be compared with the analogous relationships for movement of railway freight in the United States. In 1939 railway freight revenue equalled 8.43 percent of the value of all commodities carried.

The commodities valued at $0.50 per pound and over have been divided into eight groups as follows:

Group 1—$0.50-$0.99 per pound.
Group 2—$1-$1.99 per pound.
Group 3—$2-$2.99 per pound.
Group 4—$3-$3.99 per pound.
Group 5—$4-$4.99 per pound
Group 6—$5-$9.99 per pound.
Group 7—$10-$24.99 per pound.
Group 8—$25 up per pound.

It is evident not only that the commodities in the higher-value groups offer better prospects for air carriage than those in the lower groups, but also that a larger percentage of the commodities in the higher-value groups are likely to go by air. For example, if 2 percent of the commodities in group 1 appear to offer especially good prospects for air carriage it might be expected that 4 percent in group 2, 6 percent in group 3, and so on would offer similar prospects.

2. Perishability

In determining the list of commodities to be included under the second category, perishability, it was necessary first to define the term perishable. It is evident that a large number of commodities would be perishable if a long enough time period and sufficient exposure to the elements were assumed. In deciding whether or not a commodity is perishable when moving in international trade, consideration has been given only to the normal time spent in transit via usual surface methods of transportation, assuming customary packing, handling, and stowage of the commodity. If, for example, apples packed in barrels can be shipped from New York to Rio de Janeiro in 4 weeks, while apples packed in bar-

Digitized by Google

rels normally do not deteriorate in less than 8 weeks, then apples, for the purposes of this study, will not be considered perishable. It should be pointed out that any commodity which requires refrigerants, special temperature control, or ventilation during the period of movement is also classed as perishable.

In order to determine which of the commodities met the tests of the definition aforementioned, the cooperation of numerous commodity specialists of the Department of Commerce and other Government agencies was secured.

3. Fragility

Fragility, or breakability, is a term which, like perishability, could characterize almost all commodities under certain conditions. For the purposes of this study a commodity is defined as fragile or breakable when special care in handling or special packing is required to avoid damage under normal conditions of shipment. No attempt has been made to classify the commodities selected in respect to differing degrees of fragility.

4. Style Factor

Under the category designated style factor are included all of those commodities which lose their economic value at an exceptionally rapid rate with the passage of time because of a decline in the demand rather than a change in the physical nature of the product. Products which are subject to obsolescence are included. Examples of such are newspapers, motion-picture films and certain textiles, such as wearing apparel.

Density or Weight

The density or weight per cubic foot of a commodity is one factor affecting the cost of moving commodities. In any transportation vehicle where space rather than weight is the limiting factor, a commodity with a low density costs more per unit of weight to move than one with a higher density, and consequently, must be charged a higher rate per ton-mile. In this series of studies the density is shown where the information is available for all commodities included in the four categories listed above. In some instances, no specific density is shown but instead a density range is given. This indicates a variation in the method of packing. Some commodity classifications, furthermore, cover such a wide range of individual articles lumped together that it is impossible to determine either a *specific* density or a density range. An example of this type of "basket" classification is Export Class No. 0699 (Other Leather Manufactures).

Upon analysis, density appears to be of less importance than the four major criteria already discussed, and, on the basis of new design for post-war air cargo planes, may become even less significant in the future.

Size of Shipments

The economic and technological characteristics of steamship operations make this form of transportation especially suitable for large shipments of goods weighing many tons. These characteristics are reflected in steamship freight-rate structures which in many instances are quoted in terms of 1 ton or 40 cubic feet. Since it is customary to levy a minimum bill of lading charge, which between the United States and Brazil, for example, amounts to $7.50, as shipments fall below a certain weight, the rate per ton-mile rises progressively so that in the case of shipments of 25 or 50 pounds the rate per ton-mile will be several times that of a shipment weighing 1 ton or more On such small shipments, therefore the differences in costs between steamship and air carrier services are reduced to a minimum and air carriers will enjoy their most favorable competitive position.

The only important alternative to the freight services offered by the steamship companies is parcel post which limits maximum shipments to a few pounds. Frequently, parcel-post charges, when reduced to a rate per ton-mile basis, amount to $0.06 or $0.08 per ton-mile for shipments of 25 to 30 pounds.

It is impossible to determine from published foreign trade statistics what commodities are shipped in quantities weighing less than 1 ton. The figures show the total weight shipped per year for individual commodities, and in many instances, such shipments total much less than 2,000 pounds but it can not be determined whether these small shipments were shipped individually or consolidated with other commodities in lots weighing 1 ton or more. In recent years it has become increasingly prevalent for producers and freight forwarders to consolidate small shipments into large ones to take advantage of the lower steamship freight rates available on large shipments.

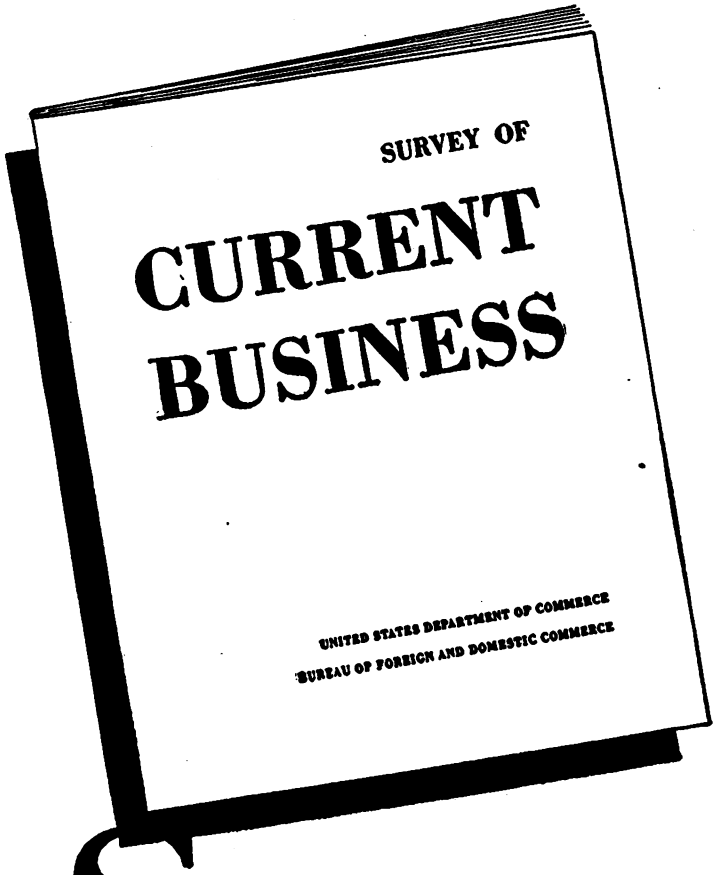
Postwar Air Cargo Rates

Recent estimates of the level of air cargo rates after the war vary from $0.05 to $0.25 per ton-mile. The differences in the estimates are primarily the result of differences in the assumptions on which the forecasts are based or on the completeness of the services under consideration. Some authorities in estimating air cargo rates have in mind airport-to-airport movement only, while others include terminal handling and pick-up and delivery services. Some writers in making postwar predictions are thinking of the period immediately following the cessation of hostilities rather than developments during the first decade. Still others base their predictions upon the assumption that the latest technological improvements will be incorporated into exclusively designed air cargo planes and that these planes will be available shortly after the war.

In the case of air cargo carriage between the United States and Latin American countries in the immediate postwar period, air cargo rates per ton-mile will depend upon whether the traffic in both directions is sufficiently large to justify specially designed air cargo planes which carry nothing but commodities. If the volume of traffic should prove to be this large, air cargo rates from airport to airport may prove to be feasible at a level of from $0.10 to $0.15 per ton-mile depending upon the territory served. If, on the other hand, air cargo volume proves to be so small that it must be carried in aircraft especially designed for the transportation of passengers and mail, then air cargo rates will probably be substantially higher.

☆U. S. GOVERNMENT PRINTING OFFICE: 1946—607793—33

Digitized by Google



$2.00 per year

SURVEY OF CURRENT BUSINESS

THIS AUTHORITATIVE MONTHLY PERIODICAL makes easily available to businessmen over 2,200 comprehensive facts about production, stocks, orders, prices, sales, shipments, etc., of the industries of the United States by means of text, tables, charts, and index numbers.

A sample copy will be sent, on request to the
Bureau of Foreign and Domestic Commerce,
Washington, D. C.

$2.00 per year, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Digitized by Google

Department of Commerce
Field Service

Albany 7, N. Y., Room 409, County Courthouse.

Atlanta 3, Ga., P. O. Box 1595.

Baltimore 1, Md., 803 Cathedral St.

Boston 9, Mass., 1800 Customhouse.

Buffalo 3, N. Y., 242 Federal Bldg.

Charleston 3, S. C., 310 Peoples Bldg.

Charleston 1, W. Va., 612 Atlas Bldg.

Chattanooga 2, Tenn., 924 James Bldg.

Chicago 4, Ill., 357 U. S. Courthouse.

Cincinnati 2, Ohio, 1204 Chamber of Commerce Bldg.

Cleveland 14, Ohio, 1286 Union Commerce Bldg.

Columbus 1, Ohio, 1037 N. High St.

Dallas 2, Tex., 602 Santa Fe Bldg.

Denver 2, Colo., 302 Midland Savings Bldg.

Des Moines 9, Iowa, 518 Grand Ave., Room 300.

Detroit 26, Mich., 1028 New Federal Bldg.

Duluth 5, Minn., 310 Christie Bldg.

El Paso 7, Tex., Chamber of Commerce Bldg.

Fargo, N. Dak., 207 Walker Bldg.

Grand Rapids 2, Mich., 736 Keeler Bldg.

Hartford 6, Conn., 436 Capitol Ave.

Houston 14, Tex., 603 Federal Office Bldg.

Jacksonville 1, Fla. 425 Federal Bldg.

Kansas City 6, Mo., 600 Interstate Bldg.

Little Rock 5, Ark., 312 Pyramid Bldg.

Los Angeles 12, Calif., 1540 U. S. Post Office and Courthouse.

Louisville 2, Ky., 631 Federal Bldg.

Manchester, N. H., Beacon Bldg.

Memphis 3, Tenn., 229 Federal Bldg.

Miami 32, Fla., 701 Congress Bldg.

Minneapolis 1, Minn., 1234 Metropolitan Life Bldg.

Mobile 5, Ala., City Hall Annex.

New Haven 10, Conn., 152 Temple St.

New Orleans 12, La., Masonic Temple Bldg.

New York 1, N. Y., Empire State Bldg., 350 Fifth Ave., 60th Floor.

Oklahoma City 2, Okla., 901-905 Petroleum Bldg.

Omaha 2, Nebr., 918 City National Bank Bldg.

Peoria 2, Ill., 531 First National Bank Bldg.

Philadelphia 3, Pa., 1612 Market St.

Phoenix 8, Ariz., 234 N. Central St.

Pittsburgh 19, Pa., 1013 New Federal Bldg.

Portland 3, Maine, 142 High St.

Portland 4, Oreg., 520 S. W. Morrison St.

Providence 3, R. I., 631 Industrial Trust Bldg.

Richmond 19, Va., 801 E. Broad St., Room 2, Mezzanine.

St. Louis 1, Mo., 107 New Federal Bldg.

Salt Lake City 1, Utah, 321 Atlas Bldg.

San Antonio 5, Tex., 101 Transit Tower Bldg.

San Diego 1, Calif., 906 Columbia St.

San Francisco 11, Calif., 307 Customhouse.

Savannah, Ga., Room 6, U. S. Courthouse and Post Office Bldg.

Seattle 4, Wash., 809 Federal Office Bldg.

Sioux Falls 6, S. Dak., 310 Policyholders National Bldg.

Syracuse 2, N. Y., 224 Harrison St.

Texarkana 5, Tex., 817 Texarkana Nat'l Bank Bldg.

Wichita 2, Kans., 205 K. F. H. Bldg.

Worcester 8, Mass., 340 Main St.

Digitized by Google

Domestic Commerce

written for

BUSINESSMEN . .

● Here is an authoritative monthly periodical written in the language of the American businessman. It is one of the principal organs of the Department of Commerce for disseminating information deemed of importance in maintaining a vigorous and dynamic free enterprise system.

● Domestic Commerce gives the reader an understanding of the progress and changing conditions of industry and business of the United States. Its writers are officials of this and other Government agencies, and specialists in the various subjects covered.

● Particular attention is given to developments in the field of post-war planning.

{ *A sample copy will be sent you upon request to the Bureau of Foreign and Domestic Commerce, Washington 25, D. C.* }

$1.00 per year . . . from the Superintendent of Documents

U. S. GOVERNMENT PRINTING OFFICE • WASHINGTON 25, D. C.

Digitized by Google

cuments Room

Foreign & Domestic Commerce Bureau

Industrial Reference Service

U. S. DEPARTMENT OF COMMERCE, HENRY A. WALLACE, *Secretary*
Office of International Trade, ARTHUR PAUL, *Director*

Part 1. TRANSPORTATION and PUBLIC UTILITIES

INDIANA UNIVERSITY
1946

Available in Parts Covering Selected Services and Commodities
Annual Subscription $1.50. Price this report 5 cents
For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., or any of the Department's Field Offices

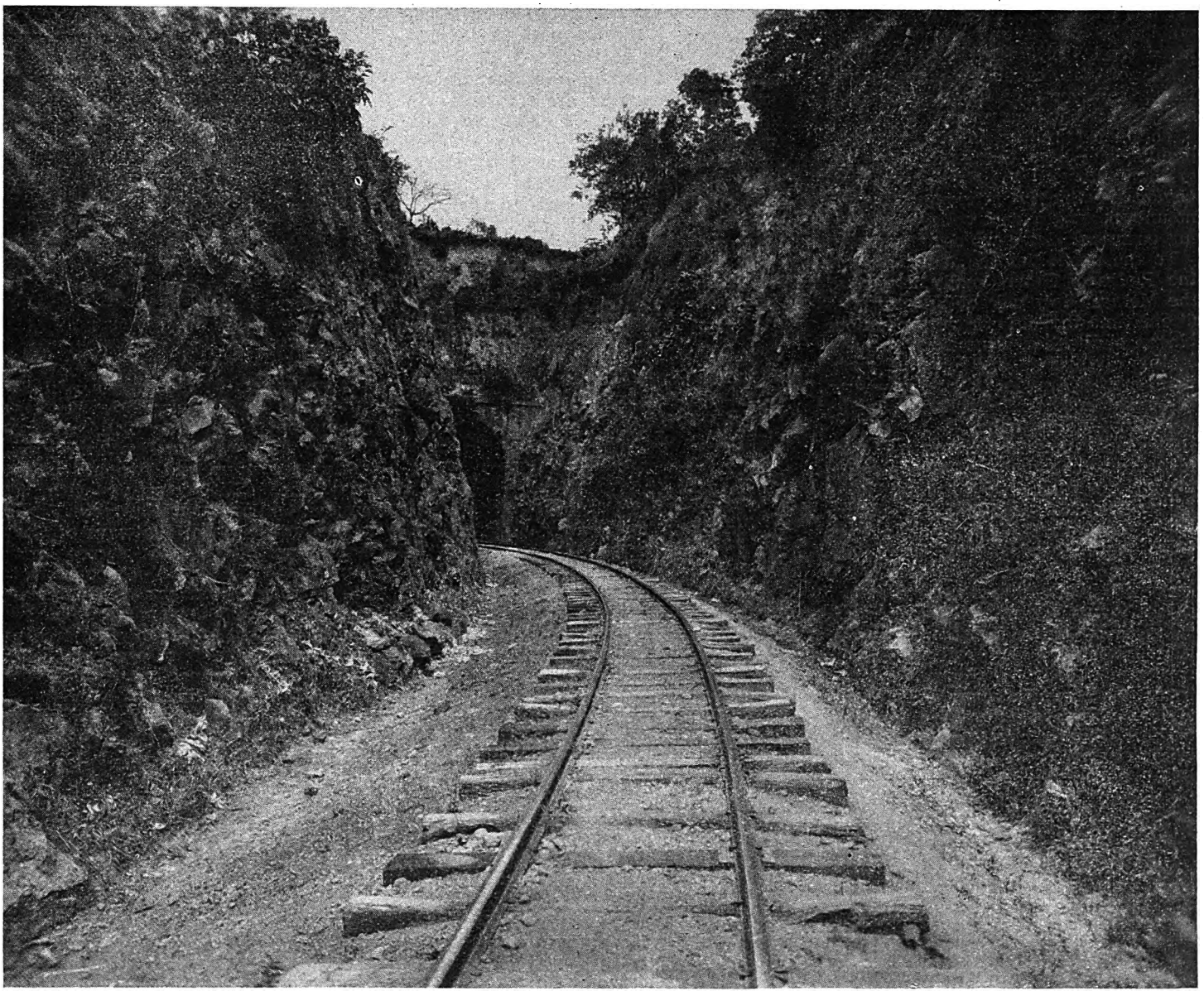
Volume 4—Part 1 September 1946 Number 17

D 16346

Railways of Guatemala and El Salvador

By Seymour T. R. Abt, Transportation and Communications Division, Special Services and Intelligence Branch

Based primarily on United States field service reports and other official sources



Courtesy of Pan American Union

The International Railways of Central America between Cutuco and San Salvador

Digitized by Google

Railways of Guatemala and El Salvador

Guatemala and El Salvador are the northernmost of the Central American Republics on the Pacific coast. The combined area of the two countries is 55,576 square miles, Guatemala having 42,400 square miles and El Salvador, the smallest Central American country, 13,176 square miles.

Guatemala

Guatemala's territory is divided into four regions. The first is the low coastal plain bordering on the Pacific, a narrow strip varying from 20 to 40 miles in width. Population here is very sparse, except in the few small seaports.

The second region is a high mountain range with an associated series of plateaus and high valleys, lying directly behind and north of the coastal plains. In this area are located great volcanic cones, some of which are active, and several are of more than 12,000 feet in height. Because of the excellent climate and fertile soil, most of the population is concentrated in this zone.

The third region is behind these highlands, where the land slopes off gradually toward the Caribbean. This region is thickly interspersed with mountain ranges and valleys extending eastward, down which rivers flow.

To the north lies the fourth region, the Plains of Peten, really a part of the Mexican lowlands of Yucatan, and at one time the site of a very populous Mayan civilization. Numerous remains of this civilization still exist, covered with matted jungle. Now the region is thinly settled, inhabited only by primitive Indian tribes.

The most important rivers in Guatemala from the standpoint of navigation are the Rio Polochic and the Rio Dulce, which flow into the gulf of Honduras. Numerous waterfalls that tumble down from the high mountains have been harnessed and not only Guatemala City but Quezaltenango and many other towns enjoy modern services provided by electricity. This power is also distributed generally over the country to coffee and sugar plantations. Guatemala's many lakes, some at high altitudes, are places of scenic interest. The principal ones are Atitlan and Izabal, both of which are navigated by steamers.

About 90 percent of the population of 3,203,209 (1940) is engaged in agriculture. Coffee and bananas are the chief export crops, and other crops are cultivated primarily for domestic consumption. These include sugar cane, cotton, corn, beans, wheat, tobacco, cacao, rice, hemp, flax, yucca, grapes, potatoes, and plantains.

Transportation

International trade is aided materially by the existence of good transportation facilities. There are five convenient ports. Two of these, Puerto Barrios and Livingston, are on the Gulf of Honduras; the remaining three, San Jose, Champerico, and Ocos, are on the Pacific coast. The International Railways of Central America connect with the National Railways of Mexico at Ayutla (a difference in gage, however, necessitates transfer) and run into El Salvador. The Pan American and several National Highways offer road transportation to neighboring countries. Air service is also provided, with Guatemala City a regular stop in the Pan American Airways schedule. There are no commercial pipe lines, but the International Railways of Central America owns a short pipe line at Puerto Barrios. This is used to pipe oil from the port to storage tanks.

Internally the most important transportation agency is the International Railways. The use of highways will undoubtedly increase in the future, and planes have been carrying rubber and chicle out of the forests for some time. Draft animals and the people themselves still carry products to markets and shipping points.

El Salvador

The coastal plain of El Salvador is from 10 to 15 miles in width. Two mountain ranges traverse the country from west to east; one just behind the Pacific lowlands, and the other along the northern border. Between them lies the plateau region, about 2,000 feet above sea level and broken by several valleys, the largest of which is that of the Rio Lempa. The mountains do not reach extreme heights in El Salvador, the highest point being Santa Ana volcano (7,825 feet).

There are numerous rivers in El Salvador, most of which are not navigable but of decided importance to agriculture and stock raising. The Rio Lempa enters the Republic a few miles southeast of the joint frontier of El Salvador, Guatemala, and Honduras, pursues a twisted course south, then east to form a section of the El Salvador-Honduras border, and then south again to the ocean. The Lempa is the largest river emptying into the Pacific south of the Colorado River. The Rio de Paz forms part of the boundary between El Salvador and Guatemala, and the Rio de Goascoran is the eastern division between El Salvador and Honduras. There are several lakes, the largest of which are Lake Guija on the Guatemalan frontier and Lake Ilopango, near the city of San Salvador.

The population of El Salvador is 1,934,925 (1944), of which over three-fifths is rural. The principal export crop is coffee, but sugar, henequen, cacao, indigo, rice, cotton, and balsam are usually available for export in small quantities. Other agricultural crops raised chiefly for domestic consumption include corn, beans, millet, wheat, tobacco, bananas, pineapples, coconuts, oranges, mangoes, papayas, tomatoes, and avocados.

Transportation

El Salvador's two railroads are the chief means of transportation but the emphasis in the past 15 years has been on highway construction, rather than rail extension. International connections are provided by the International Railways and the Pan-American Highway, and the Pacific Ocean ports of Acajutla, Cutuco, and La Libertad.

Pipe lines are employed to discharge to and load from gasoline, diesel, fuel oil, and liquid asphalt storage tanks. There are seven such lines at Cutuco, the longest of which is 3,500 feet. They belong to the International Railways, Standard Oil Company of California, Arrow Oil Company, and West India Oil Company.

Railways

The two countries together have 1,109 route miles of railroad, of which 723 miles are in Guatemala and 386 miles are in El Salvador. The gage throughout is 36 inches (0.914 meters). Of the five separate lines, three are common carriers and two are industrial lines. The company with the greatest mileage and heaviest traffic is the International Railways of Central America, which serves both countries. The IRCA extends from the northern boundary of Guatemala to the southern extremity of El Salvador, serving most of the leading centers of population, commerce, and industry, and connecting with all but one of the other lines.

THE INTERNATIONAL RAILWAYS OF CENTRAL AMERICA. Owned by private United States capital. Home address: 20 Exchange Place, New York 5, N. Y. Guatemala address: Guatemala City, Guatemala, Central America. El Salvador address: Edificio de Sola, San Salvador, El Salvador, Central America.

The IRCA runs from Ayutla on the Suchiate River, which forms the Mexican border, through Guatemala City to Zacapa, 272 miles. At Zapaca it divides, sending one line to Puerto

Digitized by Google

Barrios on the Caribbean, 103 miles, and the other to the El Salvador border, 70 miles. From here the main line winds through the length of El Salvador to Cutuco on the Bay of Fonseca, 244 miles. San Salvador is not on the main line but it is connected by shuttle service from Soyapango, 5 miles away. Branches in Guatemala serve the ports of Ocos, 13 miles, Champerico, 18 miles, and San Jose, 21 miles, as well as the towns of San Felipe, 9 miles and San Antonio, 3 miles. In San Salvador a branch serves Ahuachapan, 37 miles. Thus, of the 795 route miles of main line and branches, 509 are in Guatemala and 286 are in El Salvador. All are single-tracked. There are also 70 miles of sidings and yard track in Guatemala, and 27 miles in El Salvador. The IRCA also operates trains on a 24-mile section of the United Fruit Company line and on a 52-mile section of the Cia. Agricola line.

Permanent way—Maximum curvature: 20°. Maximum gradient: 3.7 percent in Guatemala, 3.9 percent in El Salvador. Ballast: Stone and gravel on main lines in Guatemala, volcanic ash and rock blasted from cuts in El Salvador. Ties: Native hardwood and imported creosoted pine. Rails: 60 and 70 pounds per yard on main lines and 52 and 70 pounds per yard on sidings and yard tracks in Guatemala, 54 and 60 pounds per yard in El Salvador. Guatemalan rail sections are all 33 feet long, whereas in El Salvador both 30-foot and 33-foot rail sections are employed. Signals: Hand-operated semaphores at each station in Guatemala, which has no automatic equipment. The El Salvador system is described only as "standard."

Structures—Bridges: Heaviest locomotive load 147,000 pounds, plus 93,000 pounds for loaded tender weight. Weight on drivers is 110,000 pounds for these locomotives. The bridges are not designed for heavier locomotives. Tunnels: 14 in Guatemala, of which 3 are on the Guatemala City-Puerto Barrios line and 11 on the Zacapa-frontier line. No information is available on tunnels in El Salvador.

Facilities—Repair shops: Guatemala City, for general overhaul of 85 engines and 1,893 cars in service. Minor shops at Puerto Barrios, Zacapa, Mazatenango, and Ayutla have capacities in proportion to number of stalls in respective roundhouses. Roundhouses: Guatemala City (18 stalls), Puerto Barrios (10 stalls), Zacapa (not roofed - 10 stalls), Mazatenango (4 stalls), Ayutla (2 engine tracks) Escuintla (10 stalls), San Jose (one shed for single engine), San Felipe (2 stalls), San Salvador (capacity not known). Power plants (there is no electrified track): Ayutla, Mazatenango, Guatemala City, Zacapa, Puerto Barrios, San Salvador, Cutuco. Classification yards: Ayutla (60 cars), Retalhuleu (90 cars), Mazatenango (120 cars), San Jose (96 cars), Escuintla (270 cars), Guatemala City (old yard 100 cars, Central Station 511 cars), Zacapa (192 cars), Puerto Barrios (375 cars, plus 130 cars on the wharf). No information is available on yards in El Salvador.

Equipment (December 31, 1945)—Locomotives: 78 in service, 12 in shops. Fuel is generally oil (made available under quota from the United States), although the use of wood has been reported on the Salvadoran section. Freight cars in service: 728 box, 293 flat, 299 banana, 113 stock, 2 refrigerator, 65 oil tank, 36 cabooses, 6 meat, 6 coal, 11 mixed. Freight cars in shops: 33 box, 25 flat, 50 banana, one stock, 4 oil tank, 8 cabooses, one coal, one mixed. Passenger cars in service: 35 first class, 77 second class, 13 special and chair, 22 baggage and mail, 11 combination first and second class, 4 combination first class and baggage. Passenger cars in shops: 7 first class, 5 second class, one special and chair, 8 baggage and mail, one combination first and second class.

Work cars in service: 47 ballast, 149 camp, 1 derrick, 3 steam shovels, 27 motor, 23 wrecking, 3 ditcher, 1 winch, 2 special flat, 5 business, 85 small pier at San Jose, 4 cranes, 10 automobiles and auto trucks, 1 air compressor, 3 supply, 14 dump, 2 weed burners. Work cars in shops: 3 ballast, 13 camp. Auxiliary equipment: 1 service automobile in service, 13 auto trucks in service and 20 in shops. Brakes: About 90 percent Westinghouse air. Note: Equipment of the United Fruit Company and the Cia Agricola de Guatemala also operates on IRCA lines in Guatemala as follows: 15 locomotives, 43 tank cars, 440 banana cars. El Salvador Division has about 11 additional oil tank cars privately owned.

Condition of equipment: Generally good, but strain of war years has been felt. Workshops: For repair and rebuilding only. With the exception of locally produced wood used for frames and floors and such simple metal pieces that can be made up at the foundry in Guatemala City, all materials used are imported. This foundry operates on remelted scrap and pig iron. Most of the castings, however, must be imported and machined and finished in the Guatemala shops. In the years 1939-41 a total of 252 passenger cars were converted from wood to steel.

Traffic (Guatemala 1944, El Salvador 1945; freight in tons of 2,000 pounds). Revenue freight originating Guatemala: 725 858. Freight originated El Salvador: 304,874. Revenue freight received Guatemala: 130,766. Freight received El Salvador: 67,043. Non-revenue freight Guatemala: 83,652. Passengers Guatemala: 3,145,863. Passengers El Salvador: 1,784,557. Average rates Guatemala: $0.0442 (U. S.) per ton-mile $0.127 (U. S.) per passenger-mile. Average rates El Salvador: No information available.

Financial (1945; in U. S. currency)—Railway operating revenues: $8,932, 751. Railway operating expenses: $5, 602,738. Capitalization—Common stock, issued and outstanding, 500,000 shares without par value: $31,441,144. Preferred 5 percent cumulative participating stock, issued and outstanding, 100,000 shares of $100 par value: $10, 000,000. Total capital stock: $41,441, 144. Corporate (earned) surplus: Profit and loss credit balance $15,887, 781.

THE VERAPAZ RAILWAY. This is the only common carrier railroad in Guatemala other than IRCA. It was formerly a German-owned line, but it was taken over by the Government shortly after Pearl Harbor and it now operates under the Minister of Finance. It provides a combined water and rail transportation system consisting of steamship and lighterage service from Puerto Barrios to Livingston (15 miles), a boat service from Livingston to Panzos via Lake Izabel and the Potochi River (110 miles), and rail service from Panzos to Pancajche (29.5 miles). It is the only railroad in the two countries under study that does not connect with the International Railways of Central America. Route length: 29.5 miles. Sidings: 1.1 miles. Minimum curvature: 16°. Maximum gradient: 2 to 3 percent. Ballast: some crushed rock. Ties: Steel.

No other recent information is available. The line accounts for about 1 percent of the country's railroad traffic. Operations were suspended in 1942 when it was felt that highway transport facilities were adequate to meet all needs. Operations were resumed, however, when the war-induced shortage of materials hampered motor transportation. The future of the Verapaz Railway is uncertain.

THE SALVADOR RAILWAY COMPANY, LIMITED. This is the older of El Salvador's two railroads. It traverses the richest agricultural land in the Nation and is the line which carries El Salvador's export coffee to the port of Acajutla. It is owned by private British capital. Home address: 194 Dashwood House, 69 Old Broad Street, London, E.C. 2, England. Local address: San Salvador, El Salvador, Central America.

The railway runs from San Salvador northwest to Sitio del Nino, 26 miles, where it sends branches northwest to Santa Ana on the IRCA, 25 miles, and southwest through Sonsonate to Acajutla, 44 miles. A 5-mile spur runs from Ateos to La Ceiba. The entire system is thus 100 miles long. There are also 14 miles of auxiliary track. The railway is single

Digitized by Google



tracked throughout and the gage is 3 feet (0.914 meters). There is no electrified track.

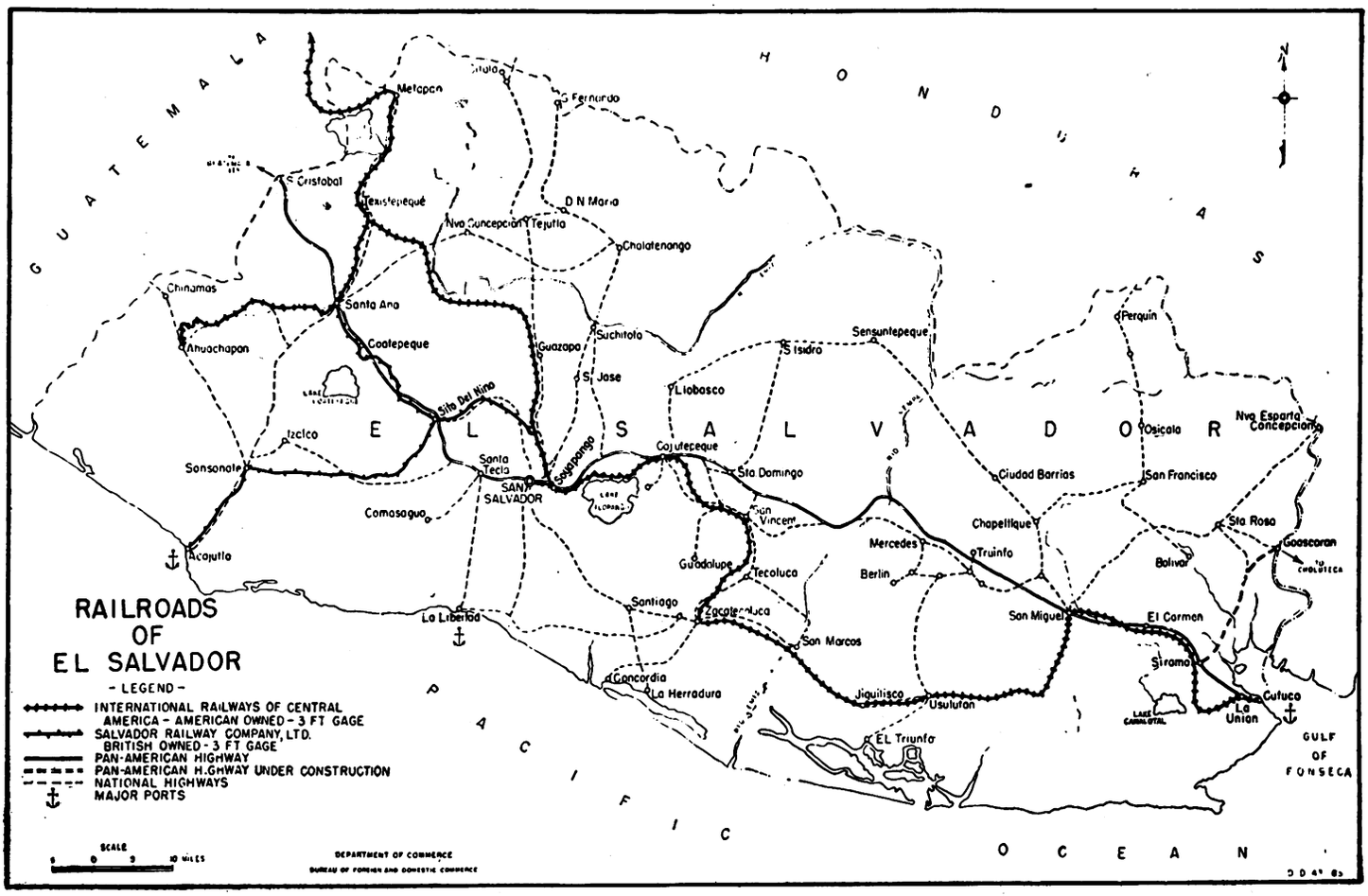
Permanent way and structures—Curvature: 16° on ordinary curves, but the minimum radius is 383 feet. Maximum gradient: 4.5 percent Sitio del Nino to Santa Ana, 2.5 percent Acajutla to San Salvador. Ballast: Practically all light soil about 1 foot deep, crushed lava north of San Salvador where line crosses 1917 lava flow. Ties: Native wood, 6″ x 8″ x 6′. Normal life of ties is 15 years. Annual replacements number 25,000 to 30,000. Rails: 54 and 60 pounds per yard. Signals: Red lanterns and red flags. No other signal equipment is in use. Tunnels: None. Bridges: Iron and steel and masonry. No other information is available.

Facilities—Roundhouses and repair shops: Sonsonate. Turntables: San Salvador, Santa Ana, Sonsonate Wyes: Sitio del Nino, Acajutla, Ateos.

Equipment (fiscal year 1944-45)—Locomotives: 13 generally in operation. Average tractive effort of locomotives: 16,000 pounds. Freight cars: 108 covered (probably boxcars), 55 flat, 7 cattle, 7 perishable stock, 5 miscellaneous motor rail cars. Average capacity of freight cars: 35,000 pounds. Passenger equipment: 27 passenger cars, 4 baggage cars, 9 motor rail cars (gasoline). Average capacity of passenger equipment: 60 persons. Average tractive effort of gasoline rail cars: 75 hp. Brakes: Hand and Westinghouse air. Workshops: Fundamentally repair shops. Materials are imported.

Traffic (fiscal year 1944-45)—145,637 tons freight, 1,338,421 passenger. Aver-

Digitized by Google



age rates; $0.088 (U. S.) per ton mile; $0.18 (U. S.) per passenger mile).

Financial (fiscal year 1944-45). Operating revenues: $551,719 (U. S.). Operating expenses: $412,835 (U. S.). Share capital authorized and issued (British currency): 25,000 six percent preference shares of £10 each, 25,000 ordinary shares of £10 each, or a total of £500,000. Debentures authorized and issued: 5 percent prior lien £ 250,000, 5 percent mortgage £ 660,000. Debentures redeemed: .5 percent prior lien £201,400, 5 percent mortgage £456,500,

Employees: About 620, mostly Salvadoran. Executives are British.

THE UNITED FRUIT COMPANY PLANTATION RAILWAYS. These industrial lines, on the Atlantic coast plantations at Bananera, Guatemala, are not common carriers, but they are of vital importance to the banana export trade, which is second only to coffee in volume and value among Guatemalan exports. The roads run from Bananera to Cheyenne, from Bananera to Quirigua and from Entre Rios to Inca. The lines are owned by the United Fruit Company. Length: 130 miles. Gage: 3 feet (0.914 meters). There is no electrified track. Home address: One Federal Street, Boston, Mass. Local address: Puerto Barrios or Bananera, Guatemala, Central America. Note: The United Fruit Company also operates about 12 miles of railroad for the United States Government in connection with abaca contracts.

Permanent way and structures—Maximum curvature: 10°. Maximum gradient: 1 percent. Ballast: River gravel. Ties: Creosoted, imported from United States. In 1944, however, Guatemalan ties were used for the first time, comprising about 40 percent of all replacements. Rails: 40-60 pounds per yard. Signal method: None. Bridges: At least one. Tunnels: None.

Facilities—Roundhouses: none, but an engine shed at Bananera (6 engines) and another in the Los Andes district (3 engines). Repair shops: Bananera, with capacity for one locomotive at a time. Locomotives and other equipment are overhauled here. Classification yards: Bananera (250 cars), Chinook (80) cars).

Equipment (1944)—Locomotives: 12 steam, crude-oil burners, all in operation and all but one in good condition. Weight on locomotive drivers: 72,000 pounds (4 engines), 44,000 pounds (5 engines), 39,000 pounds (2 engines), 28,000 pounds (1 engine). There are also a 25-ton Davenport diesel locomotive with Cummins engines and two 6-ton locomotives with Cummins engines, all in good condition, as well as five 5-ton gasoline locomotives in poor condition. Rolling stock: 56 flat cars (12-15 tons each), 50 dump cars (4-8 cu. yds. each), 2 tank cars (6,000 gallons each), 1 locomotive crane (15 tons), 1 pile driver, 43 motor cars, 6 ballast cars (10 tons each). IRCA cars are used to haul bananas. There are no passenger cars.

Traffic (1944)—2,472,841 bunches of bananas.

Financial (1944)—Railroad operating expenses: $141,660 (U. S.). Total capital investment in railroad: $1,959,900 (U. S.).

Employees (July 1945)—74.

COMPANIA AGRICOLA DE GUATEMALA. Owned by the United Fruit Company. The line extends from the banana plantations in the lowlands on the Pacific side to the IRCA. The routes are Rio Bravo to Zunil, Empalme to Izabal, Horqueta to Almolonga, and Horqueta to Totonicapan (not the city of the same name). Total route length is 56 miles. Spurs, sidings, and wyes add 27 miles of track. The gage is 3 feet (0.914 meters). Home address: One Federal Street, Boston, Mass. Local address: Tiquisate, Guatemala, Central America.

Permanent way and structures—Maximum curvature: 9° English. Maximum

Digitized by Google

gradient: 2 percent. Ballast: Sand and river gravel. Ties: Creosoted pine imported from the United States: Rails: 54, 60, and 70 pounds per yard. Signals: Hand operated. Bridges: No information available. Tunnels: None.

Facilities—Roundhouse: None. Machine shop: Tiquisate for minor locomotive repairs. Power plants: None. Classification yards: None.

Equipment (1944)—Locomotives: 2 steam (19-ton), 1 bunker oil diesel (25 tons). Rolling stock: 6 freight cars (20 tons each), 1 locomotive crane, 1 toolcar, 28 motor cars, no passenger cars.

Traffic—Freight figures are included in statistics of IRCA, which operates all trains.

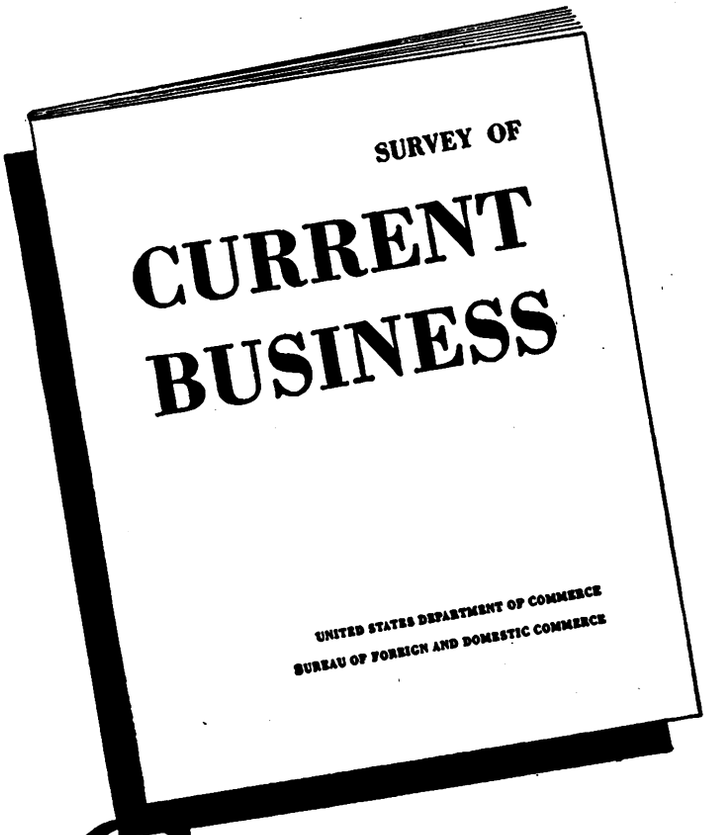
Financial (1944)—Operating expenses: $74,080 (U. S.) (operation of work trains). Approximate capital investment in railroad: $1,100,000 (U. S.).

Employees (July 1945)—140.

OTHER RAILWAYS. The only other rail line reported for both countries is a 5-mile, single-track, horse-drawn street railway between Sonsonate and Izalco in El Salvador.

☆U. S. GOVERNMENT PRINTING OFFICE: 1946—707793—50

Digitized by Google



$2.00
per year

SURVEY OF CURRENT BUSINESS

THIS AUTHORITATIVE MONTHLY PERIODICAL makes easily available to businessmen over 2,200 comprehensive facts about production, stocks, orders, prices, sales, shipments, etc., of the industries of the United States by means of text, tables, charts, and index numbers.

A sample copy will be sent, on request to the
Bureau of Foreign and Domestic Commerce,
Washington, D. C.

$2.00 per year, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Digitized by Google

Domestic Commerce

written for

BUSINESSMEN . .

• Here is an authoritative monthly periodical written in the language of the American businessman. It is one of the principal organs of the Department of Commerce for disseminating information deemed of importance in maintaining a vigorous and dynamic free enterprise system.

• Domestic Commerce gives the reader an understanding of the progress and changing conditions of industry and business of the United States. Its writers are officials of this and other Government agencies, and specialists in the various subjects covered.

• Particular attention is given to developments in the field of post-war planning.

{ *A sample copy will be sent you upon request to the Bureau of Foreign and Domestic Commerce, Washington 25, D. C.* }

$1.00 per year . . . from the Superintendent of Documents

U. S. GOVERNMENT PRINTING OFFICE • WASHINGTON 25, D. C.

Digitized by Google

Documents Room
Foreign & Domestic Commerce Bureau

Industrial Reference Service

U. S. DEPARTMENT OF COMMERCE, HENRY A. WALLACE, *Secretary*
Office of International Trade, ARTHUR PAUL, *Director*

Part 1. TRANSPORTATION and PUBLIC UTILITIES

INDIANA UNIVERSITY
1 V 41946
LIBRARY

Available in Parts Covering Selected Services and Commodities
Annual Subscription $1.50. Price this report 5 cents
For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., or any of the Department's Field Offices

Volume 4—Part 1 | September 1946 | Number 18

D 16350

Railways of Uruguay

By Elisha E. Early, Transportation and Communications Division, Special Services and Intelligence Branch
Based on Reports of Foreign Service Officers, United States Embassy, Montevideo, Uruguay, and Other Official Reports



Courtesy of Ministry of Public Instruction and Social Security

Uruguay—Electric cranes at the port of Montevideo

Digitized by Google

Railways of Uruguay

Uruguay, smallest of the South American republics, has an area of 72,153 square miles. Estimated population of the republic in 1944 was 2,235,000. Population density based on the 1944 figure is slightly more than 32 persons per square mile.

Brazil bounds Uruguay on the north, the Atlantic Ocean and the Rio Uruguay on the east, and Argentina and the Rio de la Plata on the south and west. The terrain rises gently from the eastern seaboard until it reaches upland hills at a divide known as the "Cuchilla Grande," about 1,500 to 2,000 feet above sea level. The countryside slopes from "Chuchilla Grande" to the Uruguay River. In this immediate vicinity are found some of the best grazing lands in the world.

Many tourists are attracted to Uruguay because of the fine ocean beaches and ideal climate. It is very rare for the temperature to go below freezing or rise above 72°F., and there are no pronounced wet or dry seasons. Uruguay has not only become a vacation playground for tourists from the United States and other parts of the world, but many of its South American neighbors take advantage of the beaches and climate of Uruguay and flock there to spend their vacations.

Uruguay is almost exclusively a pastoral country, livestock being the prime industry of the republic. The principal exports of Uruguay are wool, meat and canned beef, hides, skins, and their byproducts. Practically all of the few products of agriculture are used domestically, but there are some exports of barley, corn, wheat, oranges, and linseed. Some potatoes and tropical produce are imported from other countries, the major portion from the United States.

Natural mineral resources are very scarce. There are some traces of coal, but no attempts have been made to mine it. Many quarries are in operation throughout the country. They supply much granite and marble for export.

Transportation facilities of Uruguay are in better condition than most of those of the other South American republics. More than 700 miles of navigable rivers serve Uruguay, and the main highway system is reasonably well developed and should be greatly improved through appropriations provided by the recently authorized Government 5-year plan of public works.

Trackage and Ownership

The total trackage of the railways and tramways of Uruguay is 3,310.8 kilometers. A break-down shows that 2,644.8 kilometers are British controlled, and 15 kilometers are privately owned. The remainder of 651 kilometers is operated by the Uruguayan Government. Four of the more important railways of Uruguay—Central Uruguay Company of Montevideo Ltd., Midland Uruguay Railway Company Ltd., North-Western of Uruguay, and Uruguay Northern Railway—are controlled by private British interests. The railways, from their strategic locations, all have important bearings on the economy of Uruguay.

Electrified Lines

The only electrified railways in Uruguay are the streetrailways operated by the Uruguayan State Railways and the Montevideo Tramway Company. Approximately 16 kilometers of streetrailways are operated by the State Railway running from Montevideo to Santiago Vasquez. The remaining 256.8 kilometers of single-track tramways are run by the Montevideo Tramway Company. Outlying areas of Montevideo are serviced by the latter company. Power consisting of 560 volts of direct current for these lines is conveyed by overhead trolleys.

Physical Characteristics

Severe gradients and curvatures present themselves on practically all of the railways throughout the Republic. Such information as gages, length of line, and other pertinent data are included in the discussions of the individual railways.

Equipment

There is no railway equipment industry as such in Uruguay; each railway owns and operates its own repair and construction shops. The general condition of the railway equipment on the various roads in most cases is good and is still dependable for operation. Some of the locomotives have become obsolete, but this factor has not caused them to be discarded because in the case of an emergency they can be used and are often pressed into service. Materials for equipment are imported mostly from the United States. However, the equipment is assembled within Uruguay.

Signaling Equipment

The signal equipment used by the railways of Uruguay is not uniform. In most cases the signal devices vary slightly; that is, each company has in use only signals which are necessary for the safety of the road. The types of signals in use consist of automatic, hand-operated, telephone and telegraph, radio, semaphores, and flags. Flags, however, have almost completely disappeared.

Radio and Telephone

Radios are not standard equipment and are not used on the trains of Uruguay. There is in use, however, an intertrain telephone for contacting stations, and for contacting other cars of the train. These telephones are of the portable type and may be operated by connecting with plugs for intertrain communication. For contacting stations it is necessary to connect them to the telephone line which parallels the railroad.

Air Conditioning

Some of the roads employ air conditioning in a minor degree; as a whole, however, air conditioning is not in very wide use on the trains of Uruguay. Refrigerator cars are used quite extensively throughout the Republic, especially for the movement of perishable commodities, principally chilled and frozen beef. While a number of refrigerator cars are already in service on the various roads, there is, however, such a demand for this type of equipment that many more might be used.

Uruguayan Railroad System

All of the main railways of the Republic spread out in fan shape from Montevideo eastward to Puerto La Paloma on the Atlantic Coast, westward along the coast through Montevideo to the Brazilian border at Rio Braco, Rivera, Quarahy, and Quarahim. The railway system is well integrated. Helping greatly in the efficiency and operation of the railways is the uniformity of gages on the principal lines of the country.

The following data give a breakdown of Uruguayan railways which are privately owned and financed by British capital:

THE CENTRAL URUGUAY RAILWAY COMPANY OF MONTEVIDEO, LTD. (Ferrocarril Central del Uruguay). Local address: Estacion Central, La Paz 1095, Montevideo, Uruguay.

Length—single or first track, 1579.0 kilometers; construction since 1940—none; Gage—1.435 meters or 4 ft. 8½ inces. Maxmium curvature—49 percent. Minimum curvature—24 percent. Maximum gradient—1.8 percent. Brake equipment—information not available. Bridges—192 varying in length from 5 to over 400 meter spans. Tunnels—one, 228 meters in length, located at kilometer 470. Clearance—4.8 meters above rails and 2 meters each side from center of track. Cross ties—5″x 10″x7′, and average 1,230 to 1,560 per kilometer. Rails—27- to 40-foot sections and 60½ to 80 pounds per yard.

Digitized by Google

Common Carriers—Privately Owned and Financed by British Capital

Name	Main address	Local address	Route length main lines (kilometers)	Total trackage (kilometers)
Central Uruguay Railroad Company of Montevideo, Ltd.	London	Montevideo	1,579.0	1,579.0
Midland Railway Company, Ltd.	Berks, England	Paysandu	317.0	515.1
Uruguay Northern Railway	Berks, England	Paysandu	114.3	114.3
North-Western of Uruguay Railway Company, Ltd.	Berks, England	Paysandu	179.0	179.0
Total			2,189.9	2,388.0

Repair shops—Located at Penarol for locomotives, passenger cars, and freight cars. Roundhouses—Located at Bella Vista, capacity 20; Penarol, capacity 22; San Ramon, capacity 2; Nico Perez, capacity 9; Melo, capacity 5; Treinta y Tres, capacity 3; Piedras, capacity 4; Florida, capacity 2; Mal abrigo, capacity 1; Colonia, capacity 4; Puerto Sauce, capacity 2; Mercedes, capacity 4; Paso de los Toros, capacity 20; Tacuarembo, capacity 6; and Rivera, capacity 4. Classification of freight carried—Goods, livestock, wool, and stone. Employees (1945)—5,169 of whom over 90 percent are Uruguayans.

Equipment (1945)—Steam locomotives, 91 in operation total 91, first-class coaches, 45 (56-64 passengers); mixed first- and second-class passenger coaches 12 (first-class, 28 second-class, 38 passengers); second-class coaches, 36 (83 passengers); sleeping cars, 12 (18 beds, 36 seats); unspecified, including official cars, etc., 18. Baggage cars, 85; freight cars, 2,291 broken down as follows: Boxcars, 512, flat cars, 1,057, tank cars, 40, livestock cars, 595, special types, 7. Capacities of the freight cars vary and no actual data is available for publication at this writing.

Territory served.—The Central Uruguayan Railway operates between Montevideo and Colonia. This road services 11 of the 18 departments of the Republic. It is considered the most important railway. The other railways serve more or less as feeders of the Central. The southern, central, and eastern areas of Uruguay are serviced by this road.

The Central Uruguay Railway Company of Montevideo, Ltd. Traffic Statistics, 1943-44

Total freight carried....metric tons	1,183,497
Freight ton-kilometers	229,354,601
Freight train-kilometers	1,996,453
Average freight per ton-kilometer....U. pesos [1]	0.033
Passengers carried	4,232,244
Passenger-kilometers	199,520,257
Passenger train-kilometers	723,775
Average passenger fare per passenger-kilometer ....U. Pesos	0.0134
Operating revenue....do....	13,783,818
Other revenue....do....	186,704
Operating expenses....do....	13,784,949

[1] The Uruguayan peso equals $0.5263.

MIDLAND URUGUAY RAILWAY COMPANY LTD. (Ferrocarril Midland del Uruguay). Local address: Paysandu, Uruguay.

Length—Single line throughout, main line, 317 kilometers, branches, 198.1 kilometers, total, 515.1 kilometers. Gage—1.435 meters or 4 ft. 8½ inches. Maximum curvature—Main line, 21 percent, branches, 24.2 percent. Maximum gradient—Main line, 1.5 percent, branches, less severe. Bridges—142, main line, 125, branches, 17, total length of bridges, 289 meters. Tunnels—none. Clearance—4.8 meters above rails and 2 meters from center line of track. Brakes—Gresham and Craven vacuum. Cross ties—12 percent steel, remainder hardwood, average 1,230 per kilometer on main line and 1,203 on the branches. Rails—Main line, 58 pounds per yard, branches, 60½ pounds per yard.

Repair shops—The only repair shop is located at Paysandu, a shed at Salto used for minor repairs. Classification of freight carried—Parcels and luggage, goods, and livestock. Employees (1944)—9 British, 937 other nationalities.

Equipment, motive power (1945—Steam locomotives 22, 20 of which are in operation (weight on drivers 14,730 kilos). Rolling stock (1945)—Boxcars, 102 in operation, 15 not in operation (capacity 11,658 kilos); gondola cars, 205 in operation, 10 not in operation (capacity 18,467 kilos); passenger coaches, 18 in operation, 2 not in operation (capacity 14,200 kilos); baggage cars, 5 (capacity weight in kilos 16,500).

Territory served.—The Departments of Paysandu, Salto, and Rio Negro are served by the Midland Uruguay Railway. Lending importance to this line is the fact that it links the three port cities of Uruguay, namely Fray Bentos, Salto, and Paysandu. The topography served by the Midland Railway is undulating.

Midland Uruguay Railway Company, Ltd. Traffic Statistics, June 1944

Total freight carried, metric tons	192,131
Freight ton-kilometers	37,678,584
Freight train-kilometers	573,682
Average freight rate per ton-kilometer, U. pesos	0.1703 to 0.3200
Passengers carried	94,510
Passenger-kilometers	11,201,903
Passengers train-kilometers (motor coach)	148,997
Average fare per passenger-kilometer, U. pesos	0.0435
Operating revenue	1,554,770
Other revenue (Sterling)	£ 948[1]
Operating expenses	1,488,040

[1] The £ Sterling equals $4.03.

URUGUAY NORTHERN RAILWAY (Ferrocarril Norte del Uruguay). Local address: Paysandu, Uruguay.

Length—Single line throughout, no branches, 114.3 kilometers. Gage—1.435 meters or 4 ft. 8½ inches. Maximum curvature—3 degrees, 30 minutes. Maximum gradient—1.54 percent. Bridges—39 of 5 meters or less and 16 over 5 meters in length, total 55. Tunnels—None. Brakes—Gresham and Craven vacuum. Cross ties—Steel and hardwood, 2.50 x 0.24 x 0.12 meters, 1,094 average per kilometer of track. Rails—24-foot sections, 56 pounds per yard.

Repair shops—All major repairs are handled by the Midland Railway shops at Paysandu. Classification of freight carried—Parcels and luggage, goods, and livestock. Employees (1944)—British 9, other nationalities 61, total 70.

Equipment, motive power (1945)—Steam locomotives, 5 of 3,500 horsepower each. Rolling stock (1945)—Passenger coaches, 3 in operation, average weight capacity, 19,000 kilos; boxcars, 67 in operation, 9 not in operation; gondola cars, 54 in operation.

Territory served.—The Uruguay Northern Railway has an international significance in that its eastern terminal, Artigas, is on the Rio Cuareim which divides the northwest section of Uruguay from Brazil. The topography of the territory traversed by the Northern is undulating. The altitude of this section of the Republic ranges between 100 meters at kilometer 50.5 to 208.5 meters at kilometer 99.

Uruguay Northern Railway Traffic Statistics, year ending June 30, 1944

Total freight carried, metric tons	15,384
Freight ton-kilometers	1,392,202
Freight train-kilometers	28,412
Average freight rate per ton-kilometer, U. pesos	0.068 to 0.892
Passengers carried	9,881
Passenger kilometers	892,888
Passenger train-kilometers (motor coach)	53,807
Average passenger fare per passenger-kilometer, U. pesos	0.03511
Operating revenue, U. pesos	137,145
Other revenue (sterling)	£ 128
Operating expenses, U. pesos	151,626

NORTH-WESTERN OF URUGUAY RAILWAY COMPANY LTD. (Ferrocarril Noroests del Uruguay. Local address: Paysandu, Uruguay.

Length—Single line throughout, no branches, 179.5 kilometers. Gage—1.435 meters or 4 ft. 8½ inches. Maximum curvature—5 degrees, 45 minutes. Maximum gradient—2.17 percent. Bridges—133 less than 1 meter, 32 of 5 meters or more, total 165. Tunnels—None. Brakes—Gresham and Craven vacuum. Cross ties—Mixture of South American hardwoods and some steel: the steel ties are of Belgian manufacture weighing 134 pounds each. The timber ties are 2.50 x 0.24 x 0.12 meters,

Digitized by Google

1094 to 1230 ties per kilometer of track. Rails—24-foot long sections, 56 pounds per yard.

Repair shops—All major repairs are handled by the Midland Railway shops at Paysandu. Classification of freight carried—Parcels and luggage, goods, and livestock. Employees (1944)—305; information as to nationality is not available.

Equipment, motive power (1945)—Steam locomotives, 11 in operation, 5 not in operation, weight on drivers of 10,000 horsepower. Rolling stock (1945)—Passenger coaches, 9; baggage cars, 3; boxcars, 98 in operation, 6 not in operation; gondola cars, 86 in operation, 7 not in operation; flat cars, 14 in operation, 2 not in operation; cattle cars, 45 in operation, 3 not in operation.

Territory served.—The North-Western of Uruguay links the cities of Salto and Cuareim, and serves the Departments of Salto and Artigas.

North-Western of Uruguay Railway Company, Ltd. Traffic Statistics, year ending June 30, 1944

Total freight carried, tons	93,668
Freight ton-kilometers	13,375,922
Freight train-kilometers	192,068
Average freight rate per ton-kilometer, U. pesos	0.032 to 0.3147
Passengers carried	25,825
Passenger-kilometers	1,994,310
Passenger train-kilometers (motor coach)	89,099
Average passenger fare per passenger-mile, U. pesos	0.0499
Operating revenue, U. pesos	700,528
Other revenue (Sterling)	£ 3,231
Operating expenses, U. pesos	679,670

URUGUAY STATE RAILWAYS. (Ferrocarriles y Tranvias del Estado). Local address: 18 de Julio 1112, Montevideo, Uruguay.

Length—Railway, 606 kilometers, electric street railway, 16 kilometers, total 622 kilometers. Gage—Main line, 1.435 meters or 4 ft. 8½ inches, Puerto Sauce Branch, 0.91 meters, electric street railway, 1.435 meters or 4 ft. 8½ inches. Minimum curvature—Radius, 200 meters. Maximum gradient—Main line, 1.5 percent, Puerto Sauce Branch, and of the street railway gradient information not available. Bridges—Main line, 306 less than 5 meters, 74 over 5 meters; branch, 6 less than 5 meters, 6 over 5 meters; street railway, 22 less than 5 meters, 3 over 5 meters, total 417. Tunnels—None. Brakes—Information not available at this writing. Cross ties—Steel and hardwood, average 1,300 per kilometer on all lines. Rails—Attempt being made to standardize all rails on new lines, present rails 10 meters long, 32 kilometers per meter.

Repair shops—Located at Central, Salto, Fray Bentos, Tacuarembo, Empalme Olmos, Florida, Duranzo, Puerto del Sauce, Treinta y Tres; Certain of these shops are equipped to service locomotives namely, Empalme Olmos, Florida, Duranzo, Puerto del Sauce, and Treinta y Tres. Classification of freight carried—Agriculture and dairy products, timber, mineral products, manufactured goods, livestock, and miscellaneous goods. Employees (1945)——As of April 30, 1945 there were 1,669 persons employed by the State Railways, 71 being foreigners.

Railways of Uruguay

Name	Ownership and operation	Gage	Kilometers	Freight tons	Number of passengers
		(Meters)			
Ferrocarril Central del Uruguay	British	1.435	1,579.000	1,183,497	4,232,244
Ferrocarril Midland del Uruguay	British	1.435	515.139	[1] 192,131	94,510
Ferrocarril Noroeste del Uruguay	British	1.435	182.000	93,668	25,825
Ferrocarril Norte del Uruguay	British	1.435	114.312	[1] 15,384	9,881
Ferrocarriles y Tranvias del Estado	Federal	1.435	622.000	[1] 383,951	1,697,528
Ferrocarril del Puerto	Federal	} (1.435)	} (25.000)		
Ferrocarril del Piria	Uruguayan	} (0.90) 0.75	} (4.000) 15.000	108,899 (2)	
		Tramways of Uruguay			
Montevideo Tramway Co.	British	4′ 7½″	256.824		149,567,120

[1] Metric tons.
[2] Not available.

Equipment, motive power—Steam locomotives 23, not including 4 obsolete locomotives operating on the narrow-gage line at Puerto del Sauce; weight on drivers ranges from 24,700 to 38,661 kilograms. Rolling stock—Passenger coaches, 24 including 2 used on the narrow-gage line; baggage cars, 15; freight cars, all types, 808 having a capacity of from 1,010 to 4,795 metric tons; motor rail cars, 46—the majority of these cars are rented to other railways.

Territory served.—The Uruguay State Railways serve the south and eastern parts of the Republic, especially the resort areas in and around Montevideo. Expansion of the State Railways has been increased since the Government entered the field in January 1915.

Uruguay State Railways (Ferrocarriles y Tranvias del Estado) Traffic Statistics, 1943

Total freight carried, metric tons		383,951
Freight ton-kilometers		36,682,555
Freight train-kilometers		789,345
Average freight rate per ton-kilometer, U. Pesos		0.0235 to 0.0325
Passengers carried		1,697,528
Passenger-kilometers		42,991,686 [2]
Passenger train-kilometers (motor rail cars)		788,096
Passenger train-kilometers (rented motor rail cars)		2,962,200
Average passenger fare per passenger kilometer [1]	U. pesos	0.0116 to 0.0129
Operating revenue	do	1,532,168.30
Other revenue	do	514,451.93
Operating expenses:		
Railways	do	2,178,690.84
Electric street railways	do	63,061.32

[1] 1944.
[2] Of this total, 5,092,261 passenger-kilometers were carried by street railways.

ADMINISTRACION NACIONAL DE PUERTOS (Port Railway). Local address: Montevideo, Uruguay.

Length—29 kilometers. Gage—1.435 and 0.9 meters. Rails—There are three sizes of 80 pounds per yard as follows:

Equipment, motive power (1943)—8.19, 10.06, and 12.19 meters in length. Steam locomotives 10, one of these operating on the narrow-gage section of the line, horsepower ranges from 20 to 520; gasoline tractors, 3 having 40 horsepower each and operating on the standard-gage section of the line. Rolling stock—flat cars, 112; boxcars, 15; total, 127.

Repair shops—All equipment is in good condition and is maintained by the shops of the State Railway. Classification of freight carried——Canned products, meat, salted hides, dried hides, tanned hides, wool, animal hair, bones and ashes, linseed, wheat, tobacco, potatoes, rice, machinery, minerals, lumber, wood and charcoal, and all types of miscellaneous goods received at the port.

Territory served.—Provides rail transport throughout the Port of Montevideo, connecting through the Central Uruguay Railway, with the rail network of the country. It is owned and operated by the Uruguayan Government through the Port Administration.

Port Railway (Administracion Nacional de Puertos) Traffic Statistics, 1943

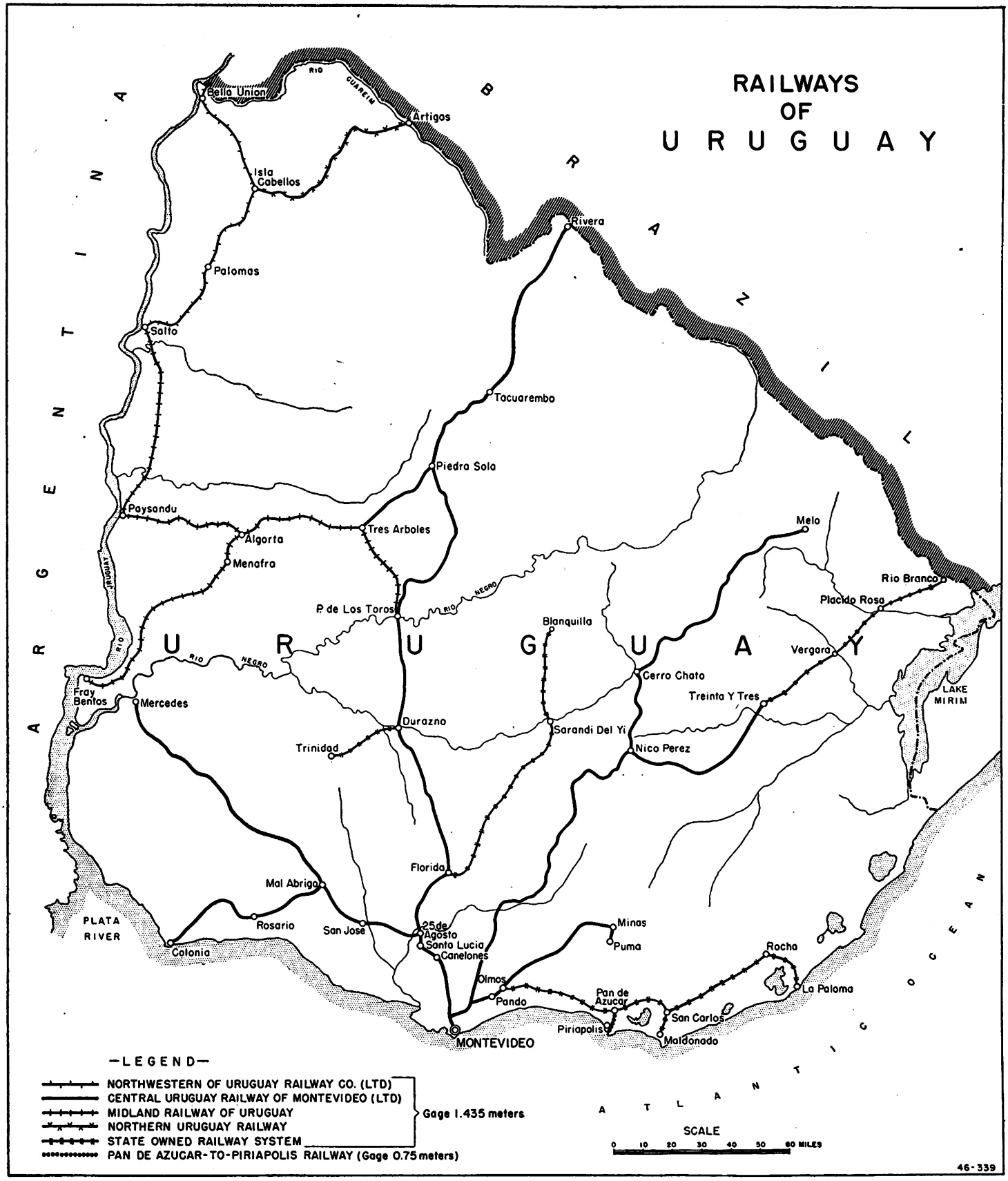
Total freight handled, metric tons	108,899
Freight handled between warehouses, tons	1,600
Number of cars received, loaded	4,696
Number of cars received, empty	2,736
Number of cars dispatched, loaded	2,740
Number of cars dispatched, empty	4,702
Ships unloaded direct to railway	5,364
Freight received from other railways, metric tons	65,318
Freight dispatched to other railways, metric tons	44,403

No figures are available concerning the revenue and operating expenses of the Port Railway.

PIRIA RAILWAY. Local address: Piriapolis, Uruguay.

Length—15 kilometers. Gage—0.75 meters. Rails—30 kilograms per meter,

Digitized by Google



obtained from the Central Uruguay Railway.

Repair shops—All repairs and maintenance of rolling stock are made at a machine shop attached to the marble quarries.

Equipment motive power (1944)—Steam locomotives, six, none of which are in operation due to need of repairs, thus service has been suspended. Inventory shows 50 flat cars, 50 dump cars, and 14 passenger coaches as still the property of the railway.

Digitized by Google

No financial information pertaining to this railroad is available.

Territory served.—This railway was built by Francisco Piria to service the large marble quarries operated by him at the Mountain of Pan de Azucar. The line connects with the State Railway at Pan de Azucar station and runs 15 kilometers to its terminal at Piriapolis. Traffic statistics over the Piria Railway are unavailable.

MONTEVIDEO TRAMWAY CO. (Sociedad Commercial de Montevideo). Local address: Rincon 508, Montevideo, Uruguay.

Length—256.8 kilometers. Gage—4 ft. 7½ inches. Rails—82 pounds per yard, 45 feet length of section, and of standard type.

Repair shops—Located at Estacion Central, Estacion Agraciada, Estacion Este, Estacion Artigas, Estacion Goes, Estacion Pocitos, Estacion Reducto, and Estacion Union. The main shop is at Estacion Central, while the others serve as emergency or auxiliary shops. Employees—3,900, 80 percent of whom are Uruguayan citizens.

Equipment—There is no complete data available on the equipment of the Montevideo Tramway Company. However, such data as is available follows: 640 streetcars with 4 wheels each and a seating capacity of 32; 10 streetcars having 8 wheels each and a seating capacity of 44. Due to the shortage of spare parts and wheels, about 80 of the aforementioned streetcars are out of service.

Territory served.—Starting at the Port of Montevideo, various lines of the Tramway extend in a fan shape throughout Montevideo and its many suburban areas.

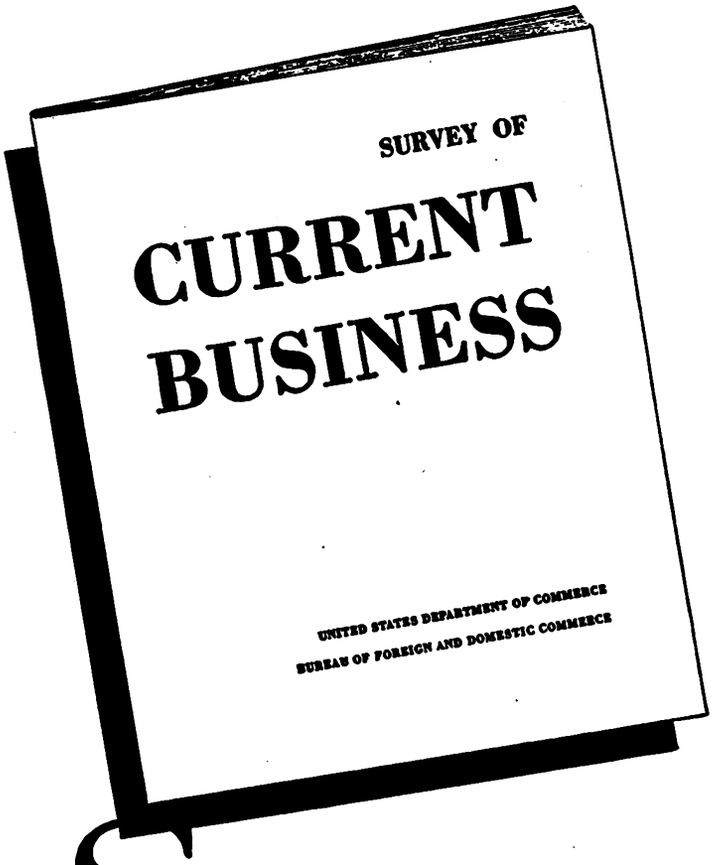
Montevideo Tramway Co. Traffic Statistics, March 31, 1944

Passengers carried [1]		149,567,120
Total kilometers		32,058,028
Number of trips		1,906,636
Revenue acquired	U. pesos	6,179,572.20
Other revenue (rental of cars to State Railway)	do	43,811.88
Operating expenses	do	5,930,945.61

[1] Fiscal year ending March 31, 1944.

☆U. S. GOVERNMENT PRINTING OFFICE: 1946—707793—51

Digitized by Google



$2.00
per year

SURVEY OF CURRENT BUSINESS

THIS AUTHORITATIVE MONTHLY PERIODICAL makes easily available to businessmen over 2,200 comprehensive facts about production, stocks, orders, prices, sales, shipments, etc., of the industries of the United States by means of text, tables, charts, and index numbers.

A sample copy will be sent, on request to the
Bureau of Foreign and Domestic Commerce,
Washington, D. C.

$2.00 per year, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Digitized by Google

Domestic Commerce

written for

BUSINESSMEN . .

• Here is an authoritative monthly periodical written in the language of the American businessman. It is one of the principal organs of the Department of Commerce for disseminating information deemed of importance in maintaining a vigorous and dynamic free enterprise system.

• Domestic Commerce gives the reader an understanding of the progress and changing conditions of industry and business of the United States. Its writers are officials of this and other Government agencies, and specialists in the various subjects covered

• Particular attention is given to developments in the field of post-war planning.

{ *A sample copy will be sent you upon request to the Bureau of Foreign and Domestic Commerce, Washington 25, D. C.* }

$1.00 per year . . . from the Superintendent of Documents

U. S. GOVERNMENT PRINTING OFFICE • WASHINGTON 25, D. C.

Digitized by Google

Documents Room

Foreign + Domestic Commerce Weekly

Industrial Reference Service

U. S. DEPARTMENT OF COMMERCE, HENRY A. WALLACE, *Secretary*

Office of International Trade, ARTHUR PAUL, *Director*

Part 1. TRANSPORTATION and PUBLIC UTILITIES

INDIANA UNIVERSITY 1 1 1946 LIBRARY

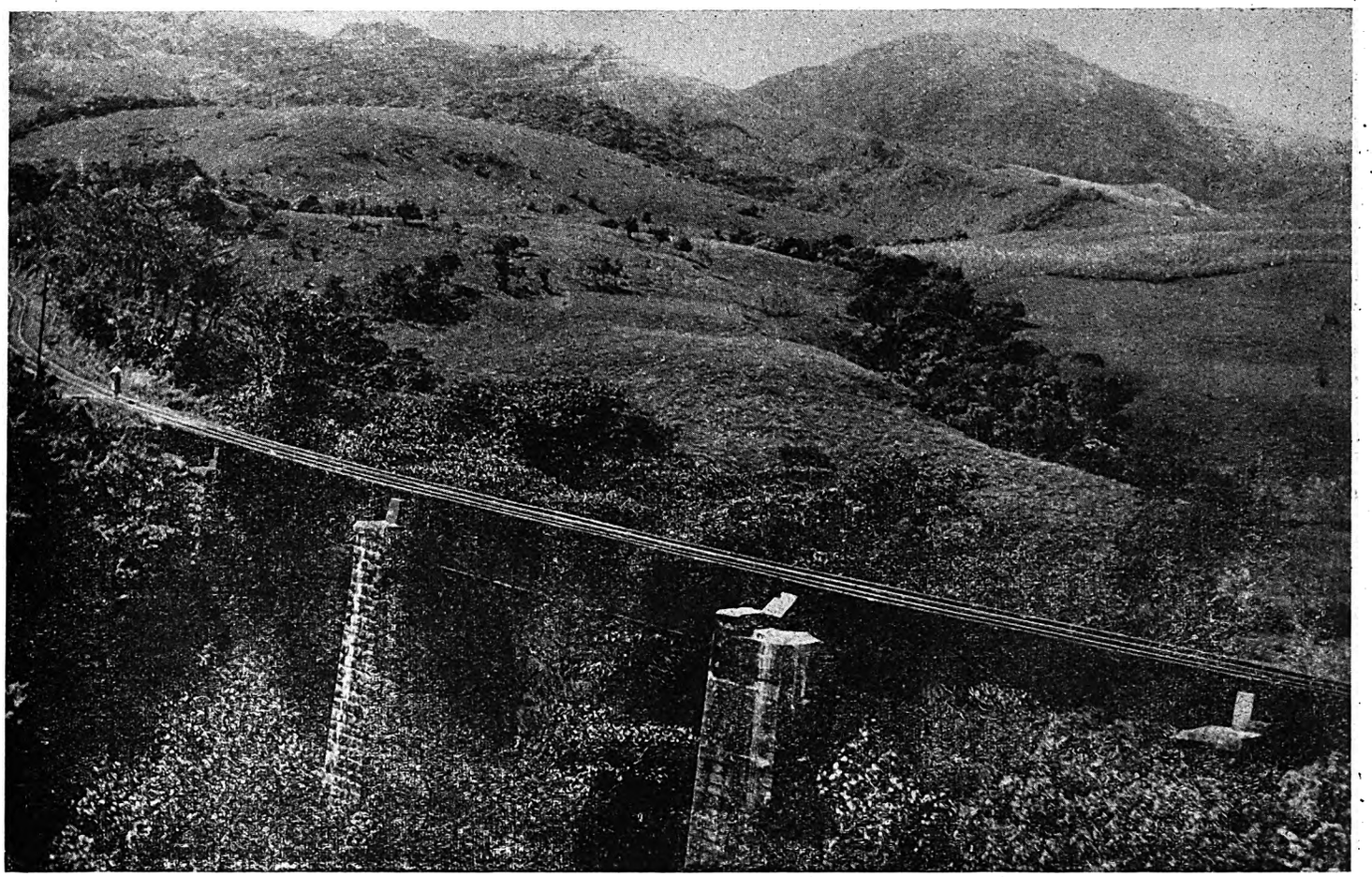
Available in Parts Covering Selected Services and Commodities
Annual Subscription $1.50. Price this report 5 cents
For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., or any of the Department's Field Offices

Volume 4—Part 1 September 1946 D 16349 Number 19

Railways of Honduras, Nicaragua, Costa Rica, and Panama

Based primarily on United States Foreign Service reports and other official sources

By Seymour T. R. Abt, Transportation and Communications Division, Special Services and Intelligence Branch



Courtesy Pan American Union

Virrilla Bridge on the Atlantic Slope, Costa Rica

Digitized by Google

Railways of Honduras, Nicaragua, Costa Rica, and Panama

The Railways of Honduras

The Republic of Honduras, with an area of about 46,000 square miles, is the third Central American country in point of size. Its Caribbean coastline is 350 miles long and its Pacific Coast (Gulf of Fonseca) about 50 miles. The interior is largely mountainous, reaching heights of 10,000 feet above sea level. Along the coast are areas of low, level plains, much wider on the Atlantic side than on the Pacific. On the high plateau the temperature is mild, but along the coastal belt it is hot and humid.

Economy

Honduras is essentially an agricultural country, with bananas—the leading export commodity—occupying more acreage than any other crop. Corn, beans, coffee, sugar, wheat, potatoes, rice and yucca are produced in substantial quantities primarily for domestic consumption. Other products include sesame, cacao, maguey, henequen, cotton, and copra. Stock raising is an expanding industry. Mineral deposits yield gold, and deposits of antimony, manganese, and mercury are known to exist. Manufacturing is comparatively undeveloped. It is characterized by small establishments producing for a limited market.

Transportation

A glance at the map will show the lack of any extensive system of transportation. Three railroads are in operation, but they serve only the northern coastal regions and exist primarily for the banana business. About 600 miles of highway make up the entire road network. The inland waterways include many rivers, chief among which is the Ulua, which drains about one-third of the country and is navigable for approximately 125 miles by vessels of 20-foot draft. Lake Yojoa, 25 miles long and 6 to 8 miles wide, has ferry service between Jaral and Pito Solo for users of the Northern Highway. Commercial aviation has developed rapidly. There are more than 20 airfields, half of which are used even during the rainy season. Both Pan American Airways and *Transportes Aereos Centro Americanos* (TACA) serve Honduras.

THE HONDURAS NATIONAL RAILWAY *(Ferrocarril Nacional de Honduras)*. Owned by the Government and operated by the Tela Railroad Company. This is the only railway in Honduras that was built to serve as a common carrier. It extends from Puerto Cortes to Potrerillos. Here it connects with the Northern Highway, which leads to Tegucigalpa, the capital, and the Pacific Coast. The main line is 59 miles long, and there are 29 miles of branches and spurs. The gage is 42 inches. The address is Puerto Cortes, Honduras, Central America.

Permanent way and structures—Maximum curvature: 7° metric. Maximum gradient: 2.5 percent. Ballast: mostly gravel. Ties: creosoted and native wood. Rails: 56 and 60 pounds per yard. Signals: manual. Bridges: steel and wood. Tunnels: none. Clearance: 16′2″.

Equipment (June 30, 1945): Locomotives: 5 Davenport, 3 Baldwin, 2 Dickson, one Lima. All are oil burners. Freight cars: 41 box, 54 rack, 24 flat. 2 cabooses. Passenger cars: 10 coaches, 2 baggage, 3 motor rail. Workcars: 42, including 2 tanks. Couplers: automatic. Brakes: air. Fuel consumed (year ending June 30, 1945): 20,792 barrels crude oil. 7,878 gallons gasoline. 4,784 gallons diesel oil.

Traffic (year ending June 30, 1945): 68,195 metric tons freight, 111,873 passengers.

Financial (year ending June 30, 1945)—Operating revenues: 679,930 lempiras (1 lempira equals $0.4902 U. S. at official rate, as of March 31, 1946). Operating expenses: 603,552 lempiras. Capital: 3,367,054 lempiras.

Employees (year ending June 30, 1945): 355.

TELA RAILROAD COMPANY. Subsidiary of the United Fruit Company. The principal business is the production and exportation of bananas, and the railroad itself is only a department of the company. There are two main lines: From Baracoa south to La Lima, 34 miles; and from Tela southwest and south to El Progresso, 73 miles. These 107 miles of main line are fed by numerous branches and spurs from the banana farms. The largest branch is often referred to as the "Ulua Branch Line." Branches and spurs add a total of 204 miles to the Tela system. The gage of the railroad is 42 inches, and there are 9 additional miles of 30- and 24-inch lines. The United Fruit Company's home address is One Federal Street, Boston, Mass. The local address of the Tela Railroad Company is La Lima, Honduras, Central America.

Permanent way and structures—Maximum curvature: 12° English. Maximum gradient: 1.7 percent. Ballast: rock, gravel, sand, and earth. Ties: creosoted and natural wood. Rails: 30, 40, 50, 56, 60, and 70 pounds per yard. Signals: manual. Bridges: steel and wood. Tunnels: none. Minimum clearance: 16′2″.

Facilities—Repair shops: Puerto Cortes, probably for use of National Railway and Tela Railroad, Tela. Yards: Puerto Cortes (400 cars), for use of National Railway and Tela Railroad, Tela (400 cars). La Lima (250 cars).

Equipment (June 30, 1945)—Locomotives: 33 freight, 2 passenger, all burning bunker "C" grade oil. Rolling stock: 168 boxcars, 754 banana cars, 254—flatcars, 43 tank cars, 3 icecars, 9 cabooses, 2 garbage · dumpcars, 4 cranes, 2 locomotive tractors, 2 weed burners, 3 pile drivers, 2 armed pay cars, 26 coaches, 82 camp cars, 56 motor rail cars, 17 miscellaneous cars. Couplers and brakes: Gould in general use.

Freight (1944): 554,667 tons freight, 388,348 passengers.

Financial (1944): Operating expenses: $1,080,888 (U. S.). Earnings: $879,937 (U. S.) (banana freight), $139,292 (U. S.) (revenue earnings), $41,192 (U. S.) company freight earnings, $30,522 (U. S.) miscellaneous earnings.

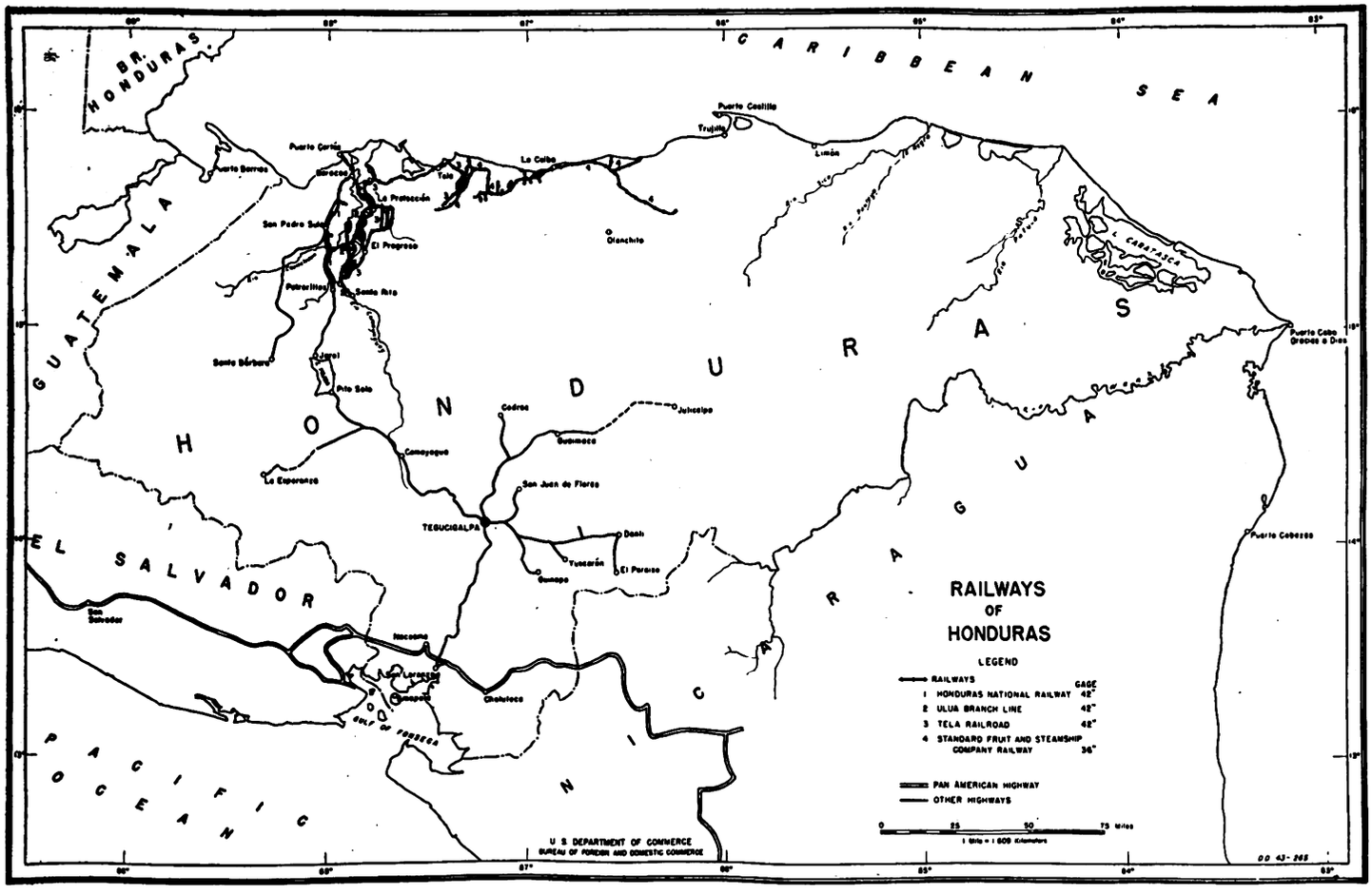
Pipe lines owned by Tela Railroad Company—Crude Oil: Puerto Cortes (10″ diameter—wharf to storage tanks) and Tela (12″ diameter—wharf to storage tanks). Diesel oil: Puerto Cortes (6″ diameter—wharf to storage tanks), Tela (6″ diameter—wharf to storage tanks).

STANDARD FRUIT & STEAMSHIP COMPANY. This railroad also is a department of a company engaged in the banana business. The line runs along the coast east to Paso Arenal, 89 miles, and west to Tela, 61 miles, and there were about 113 miles of branches, spurs, sidings, and yard track at the end of 1944. The gage is 36 inches. The Company's home address is American Bank Building, New Orleans, La., and its local address is La Ceiba, Honduras, Central America.

Permanent way and structures—Maximum curvature: 20°. Maximum gradient: 2 percent. Ballast: light. Ties: salted pine. Rails: east line 60 pounds per yard, west line 60 pounds per yard for the first 44 miles, then 40 pounds per yard. Bridges: 528 wood, 41,204 feet; 7 steel, 2,334 feet. Tunnel: one 237 feet. Minimum clearance: 20′8″ height, 13′8″ width.

Facilities—Roundhouse, machine shop, carpenter shop, car repairshop, motor car shop, all in La Ceiba. Capac-

Digitized by Google



ity is sufficient for maintenance of all rolling stock.

Equipment (1944)—Locomotives (oil burners): 29 in operation, 2 not in operation. Weight: 18,000—160,000 lbs. each. Tram locomotives: 1 diesel, 2 gasoline, all in operation. Weight 10,000 lbs. each. Freight cars (all in operation): 79 box (capacity 12 tons each), 285 banana (capacity 12 tons each), 180 flat (capacity 12 tons each), 13 tanks (capacity 5,000-8,000 gallons each), 2 refrigerator (ice—capacity 12 tons each), 39 miscellaneous. Passenger cars (all in operation): 17 (capacity 50 passengers each), 2 baggage (capacity 12 tons each), 41 motor rail. Couplers: Climax. Brakes: Westinghouse air. (Note—All cars are built in shops. Trucks, brakes, and couplers are imported. Wood for construction is obtained locally.)

Traffic (1944): 12,653 carloads bananas, 2,515 carloads logs, 5,834 carloads poles were the principal freight, 76,383 revenue passengers. Passenger fares: $0.02 (U. S.) per kilometer first class, $0.01 (U. S.) per kilometer second class.

Financial (1944)—Revenue (other than bananas): $195,662 (U. S.). Operating expenses: $529,707 (U. S.). Balance is considered as revenue from banana freight.

Employees (1944): 1,117.

The Railways of Nicaragua

Nicaragua has an area of about 57,000 square miles and is the largest of the Central American Republics. It has a coastline of about 200 miles on the Pacific and of more than 300 miles on the Caribbean. A northern extension of the Andes Mountains cuts across the country in a northwesterly direction. Approximately one-fourth of Nicaragua lies west of this range. In this section are the capital, most of the agricultural activities, and nearly half of the population. The climate of Nicaragua is tropical, with the mountainous region cooler than the coastal areas.

Economy

Nicaragua is almost wholly an agricultural country. Coffee, grown in the west, and bananas, cultivated in the east, are the chief agricultural exports, but some cotton, sugar, cocoa, and cottonseed have been produced for foreign markets. Among the many agricultural products grown principally for domestic consumption are corn, beans, potatoes, rice, cotton, tobacco, pineapples, and citrus fruits. Livestock is raised and hides and skins are exported. Forest resources are extensive, and the collection of rubber was stimulated during the war.

Mining has been developed only slightly, except for gold and, to a lesser extent, silver. Other minerals include salt, limestone, copper, lead, zinc, tin, nickel, mercury, iron, sulphur, and precious stones.

Manufacturing is limited to the processing of agricultural commodities and the simpler types of consumer goods. Sugar grinding and alcohol production are notable industrial undertakings. Other manufacturing is characterized by small shops with few workers. Products include soap, cotton piece goods, lumber, furniture, leather goods, clothing, tobacco products, beer, soft drinks, matches, shoe polish, candles, perfumes, and pharmaceuticals.

Transportation

Land transportation facilities are almost wholly confined to the west, where they serve the heavy concentration of population. The Pacific Railway, the only common-carrier system, is located here. Highways are few; there are not much more than 100 miles of all-weather roads, most of which are concentrated near Managua. The large, fresh-water lakes, Managua and Nicaragua, facilitate inland transportation. The latter leads to the Caribbean by way of the San Juan River (the route of a proposed interoceanic canal,) but

Digitized by Google

the mouth of the river is closed to ocean-going vessels by sandbars. In general, the rivers flow eastward.

Aviation has developed rapidly in Nicaragua. It provides the only adequate transportation between east and west and reaches many otherwise inaccessible gold mines. Pan American and TACA both serve Nicaragua.

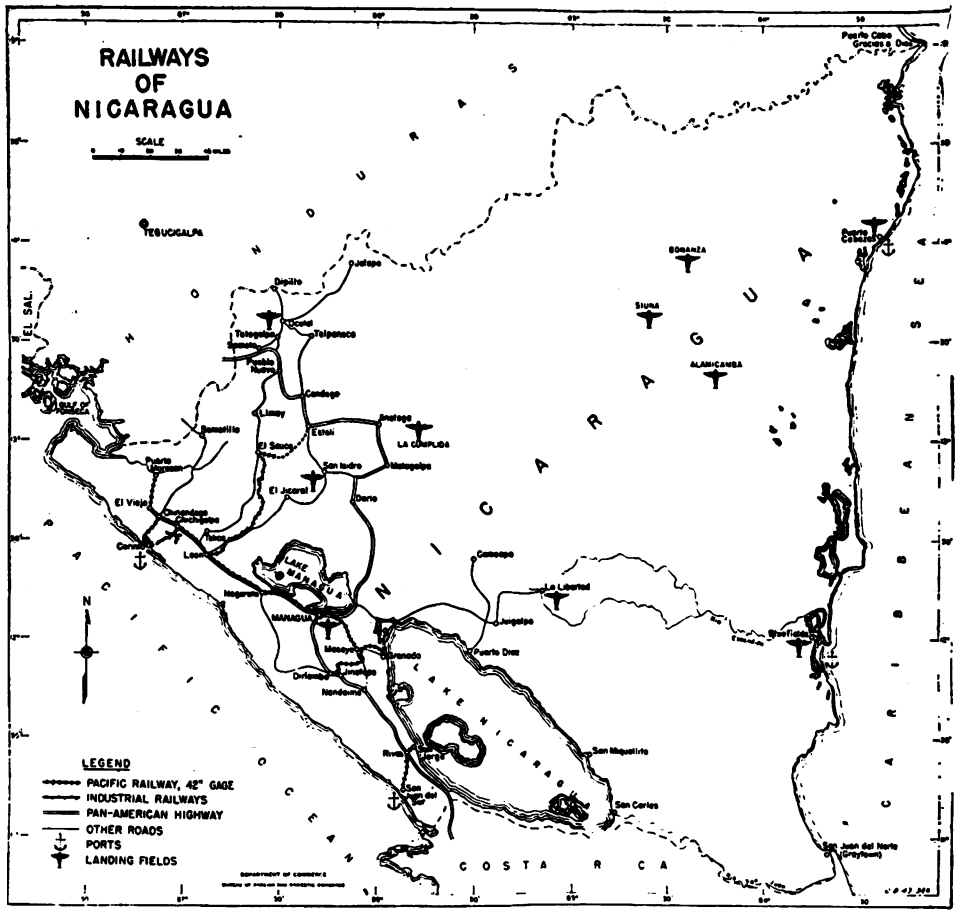
The leading Nicaraguan port is Corinto, the western terminus of the Pacific Railway. It has an excellent natural harbor and handles about half the country's foreign trade. San Juan del Sur, connected to Lake Nicaragua by the Pacific Railway, serves the lower Pacific Coast area and the interior which sends its traffic over the lake. Bananas and a large part of the forest products move through Bluefields and Puerto Cabezos.

PACIFIC RAILWAY OF NICARAGUA *(Ferrocarril del Pacifico de Nicaragua)*. Owned by the Government. Operated by the railway administration are also a shipping line on Lake Nicaragua; port facilities at Corinto, Granada, Puerto Diaz, and Masachapa; and the Northern Highway and Puerto Diaz-La Libertad Highway. The Pacific Railway is the sole means of transportation between Corinto and Managua, and points enroute, for oil, gasoline, and other strategic supplies to the interior, and for coffee, rubber, balsa wood, other forest products, oil seeds, skins, sugar and ipecac to the port. Address: Managua, Nicaragua, Central America.

The main line runs from Corinto to Chinandega and then veers southeast to Leon, Nagarote, Managua, Masaya, and Granada, a distance of 119 miles. Branches run from Chinandega to Puerto Morazan, 19 miles, from Leon to a point beyond El Sauce, 53 miles, and from Masaya to Diriamba, 27 miles. A separate line extends from San Juan del Sur to San Jorge, 19 miles. The total route distance of the railroad is thus 237 miles. There are also 29 miles of sidings, spurs, and yard tracks. The gage throughout is 42 inches.

Permanent way and structures—Maximum curvature: 10°. Maximum gradient: 3 percent. Ballast: Dirt. Ties: Native hardwoods, usually; replacements prompt. Rails. Corinto-Granada 76 percent, 60 pounds per yard, 24 percent, 50 pounds per yard; Masaya-Diriamba 40, 50, and 60 pounds per yard, other branches 40 pounds per yard. Bridges: 3, one of which is 1,350 feet long and has 54 spans. Culverts: 54. Tunnel: One.

Facilities—Roundhouse: Managua, for 9 locomotives. Repairshop: Managua equipped for major locomotive repairs and castings of over 1,000 pounds. Box and passenger cars are constructed from locally produced wood, using imported frames. All materials except wood are imported.



Equipment (June 30, 1944)—Locomotives: 29 in operation, one under repair. Freight cars: 5 box in operation, one under repair (cap. 10,000 kgs. each), 6 box in operation, one under repair (cap. 12,000 kgs. each), 11 box in operation (cap. 15,000 kgs. each), 93 box in operation (cap. 18,000 kgs. each), 23 box in operation (cap. 30,000 kgs. each), 6 flat in operation (cap. 15,000 kgs. each), 55 flat in operation (cap. 18,000 kgs. each), 15 flat in operation (cap. 33,000 kgs. each), 4 cattle cars in operation, one under repair (cap. 18,000 kgs. each), 7 banana in operation (cap. 30,000 kgs. each), 10 oil tanks in operation (cap. 15,000 kgs. each), 6 oil tanks in operation (cap. 18,000 kgs. each), 4 oil tanks in operation (cap. 10,000 kgs. each). Passenger cars: 53 in operation, 3 under repair, 4 motor rail in operation, 4 not in operation. Work cars: 53 in operation, 5 under repair. Couplers: Gould automatic. Brakes: Westinghouse air.

Traffic (year ending June 30, 1944): 203,042 metric tons freight originating, 14,083 metric tons express freight originating, 2,370,573 passengers. Average rates: 0.295 cordobas per ton-kilometer freight, 0.03226 cordobas per passenger kilometer (Note: 1 cordoba equals $0.20 U. S. at official rates, as of April 16, 1946).

Financial (year ending June 30, 1944)—Operating revenues: 8,240,275 cordobas (from railway operation only). Operating expenses: 4,756,282 cordobas (in railway operation only). Capital stock: 33,000 shares at 100 cordobas each (all owned by Government since purchase on February 5, 1940).

Employees (year ending June 30, 1944): 2,625 average per month.

INDUSTRIAL RAILWAYS. There are a few industrial lines in Nicaragua, the largest of which is operated by the Nicaragua Sugar Estates. This system comprises 27 miles of track and connects with the Pacific Railway at Chichigalpa.

The Railways of Costa Rica

The Republic of Costa Rica is fifth in size among the Central American countries, with an area of about 23,000 square miles. Its Caribbean coastline is 125 miles long and regular in shape. The Pacific shore of 360 miles is very irregular, with two peninsulas embracing broad gulfs. The Andean chain traverses the entire length of Costa Rica from northwest to southeast and a broad tableland drops away from it on both sides to narrow coastal plains. The climate varies with the altitude.

Digitized by Google

Economy

Costa Rica is similar to other Central American Republics in that its economy is predominantly agricultural. Coffee, bananas, and cacao are the chief export crops, but other products, notably sugar cane, corn, beans, and rice, are raised for home consumption. New agricultural enterprises include rubber and abaca cultivation and the production of a wide variety of fruits and vegetables.

Mining and lumbering yield other exports. Gold is mined along the Pacific Coast. Other minerals, which lie unexploited in the subsoil, are silver, copper, manganese, iron, nickel, mercury, coal, and sulfur. Forest exports include cedar, balsa, and cocobolo, and domestic furniture is made of mahogany, cedar, and rosewood. Oak, ebony, rubber, and fustic are other forest resources.

Manufacturing is on a small scale and limited to the production of consumer goods. There is a small shoe industry that operates with hand labor, a cigarette factory, two match factories, a canning factory, a soap factory, and a brewery.

Transportation

The transportation system consists chiefly of an interoceanic rail service. Railways not on this route are widely separated industrial lines. The country's many rivers are sources of hydroelectric power, but few are navigable by ships of any size. There are 743 miles of highways and about 3,500 miles of trails. All improved roads, however, are located within the plateau section radiating from San Jose. The construction of highways which might compete with the railroads is not encouraged. Limon and Puntarenas are the principal ports of the republic. Quepos and Sixaola are chiefly banana ports. Air service links San Jose with other Central American cities and with the United States.

PACIFIC ELECTRIC RAILWAY *(Ferrocarril Electrico al Pacifico)*. This system, which runs from Puntarenas on the Pacific Coast, to San Jose, is owned by the Costa Rican Government. The main line is 72 miles long, and there are 11 miles of branches and sidings. The gage is 42 inches. All track is electrified. Current is single-phase, alternating, 20 cycles, 15,000 volts and is supplied through overhead trolley contact. Address: Calle 2, Ave. 20, San Jose, Costa Rica, Central America. Purchases are made through the *Proveeduria Nacional*.

Permanent way and structures—Maximum curvature: 288-foot radius. Maximum gradient: 3 percent. Ballast: crushed stone. Ties: Domestic lumber. Rails: 70 and 80 pounds per yard on the main line. Signals: Automatic electric. Bridges: Torres, Virrilla, Bermudez, Quebrada Seca, Rio Segundo, Ciruelas, Rio Grande, Jesus Maria, Barranca, Rio Esparta. Tunnel: Cambalache, 1,099 feet long.

Facilities—Repairshops: San Jose, Puntarenas. Classification yards: San Jose, Puntarenas. Power plant: Tacares.

Equipment (February 1, 1945—Locomotives (all in operation): 6 coal burners for yard use, 2 diesel, 10 electric. Freight cars (all in operation): 212 box, 27 gondolas or ore, 45 flat, 3 gasoline tank. Passenger cars: 45 coaches, 14 baggage, 13 motor rail. Couplers and brakes: All of United States makes (mostly Westinghouse brakes). Note: Equipment is all imported. Some wooden car bodies are built at the repair workshop, which is in San Jose.

Traffic (1944): 202,189 metric tons freight, 542,034 passengers. Average rates: 0.1973 colones (one colon equals $0.1779 at controlled rates) per ton-kilometer, 0.067142 colones per passenger-kilometer.

Financial: Recent data are not available.

Employees (1944). 1,475.

NORTHERN RAILWAY COMPANY OF COSTA RICA. This concern's stock is held by the Costa Rica Railway Company, Limited, and the two enterprises are operated as one. The system is owned by British investors. The main line runs from Limon through San Jose, 103 miles, to Alajuela, 117 miles. There are 210 miles of branches and sidings. The gage is 42 inches. Address: Avenida la., Calle 5a., San Jose, Costa Rica, Central America. Purchasing agents: Temperleys, Haslehurst and Co., Inc., 70 Pine Street, New York, N. Y.

Permanent way and structures—Maximum curvature: 30°. Maximum gradient: 4 percent. Ballast: Stone. Ties: Pine, steel, and local woods. Rails: Main line mostly 60 pounds per yard, with some of 70 pounds per yard; 50 pounds per yard and less also reported. Signals: Manual. Bridges: 130. Tunnels: 2, about 600 feet long.

Facilities—Engine sheds: Limon (10), Siquirres (2), San Jose (4). Repairshops: Limon, San Jose. Power plant: Limon. Classification yards: None.

Equipment (1944)—Locomotives (crude-oil burners): 32, including 3 (date 1890; 56,000 lbs. each on drivers), one (date 1900; 71,740 lbs. on drivers), one (date 1904; 58,800 lbs. on drivers), 4 (date 1899, 1900; 66,000 lbs. each on drivers), 5 (date 1886, 1887; 63,500 lbs. each on drivers), 2 (date 1900; 69,000 lbs. each on drivers), 4 (date 1892-1896: 77,400 lbs. each on drivers), 6 (date 1901-1906; 79,500 lbs. each on drivers), 6 (date 1907; 82,500 lbs. each on drivers). Freightcars; 641, including 66 box (capacity 24,000 pounds each, 227 box (capacity 40,000 pounds each), 8 gondolas (capacity 20 cu. yds. each), one gondola (capacity 30 cu. yds.), 5 flat (capacity 60,000 lbs. each), 108 flat (capacity 50,000 lbs, each), 13 flat (capacity 40,000 lbs. each), 18 flat (capacity 24,000 lbs. each), 10 fuel oil tank, one diesel oil tank, one oil and water tank, 3 cocoa, 127 banana, 27 stock, 11 coffee, 15 cabooses. Passenger cars; 46, including 14 first class (capacity 52 persons each), 12 second class (capacity 66 persons each), 3 first and second class (capacity 20 and 40 persons), 2 first class and baggage (capacity 48 persons each), 3 second class and baggage (capacity 48 persons each), 5 chair (capacity 28 persons each), 3 motor rail (capacity 30 persons each), 4 baggage (weight 33,800 lbs. each). Workcars: 16, including 15 air dump (capacity 10 cu. yds. each), one ballast (capacity 30 cu. yds.). Couplers: Tower. Brakes Westinghouse. Note: No complete units are built by the railway. All materials, except lumber, are imported.

Traffic (rough average for 1943 and 1944): 200,000 tons freight, 700,000 passengers. Average rates: $0.067 (U. S.) per ton-mile, $0.012 (U. S.) per passenger-mile.

Financial (rough average for 1943 and 1944)—Operating revenues: $900,000 (U. S.). Operating expenses: $750,000 (U. S.). Capitalization (June 30, 1944, in British currency): £1,800,000 stock authorized and issued, £655,000 first mortgage debentures (6½ percent) authorized and issued £600,800 second debentures (6½ percent) authorized and issued.

Employees (annual): About 1,700, including 4 United States and 6 British executives.

UNITED FRUIT COMPANY RAILWAY *(Compania Banenera de Costa Rica)*. The United Fruit Company operates three separate rail systems in Costa Rica. Two of these, known as the Quepos and Golfito Divisions, are wholly within Costa Rica. The third, the Panama Division, has most of its track in Panama and will be treated in the Panamanian section of this study. Home address of the United Fruit Company is One Federal Street, Boston, Mass. Purchasing office address is J. R. Kansas, General Manager, Purchasing Department, Pier 3, North River, New York, N.Y. Local address is San Jose, Costa Rica, Central America.

THE QUEPOS DIVISION connects the individual banana farms near Parrita with the Pacific port of Quepos. The main line is 20 miles long, but there are 60 miles of auxiliary track. The gage is 42 inches.

Permanent way and structures—Maximum curvature: 9°. Maximum gradient: 1 percent. Ballast: Gravel. Rails: 48, 50, and 60 pounds per yard. Bridges: Over Parrita, Paquito, and Naranjo Rivers for loading E-24. Tunnels: None.

Digitized by Google

Facilities: Roundhouse, repairshops, power plant, and classification yards: Quepos. Minor facilities at Parrita.

Equipment (1944)—Locomotives (oil burners): 14. Average tractive effort: 12,600 pounds. Freight cars: 18 box (capacity 30 tons each), 11 gondolas (capacity 30 tons each), 54 flat (capacity 30 tons each), 237 banana (capacity 12 tons each), 5 oil tank (capacity 6,000 gallons each), 79 miscellaneous (probably including work cars—capacity 10 to 30 tons each). Passenger cars: 4 coaches (capacity 40 passengers each), 2 baggage (capacity 20 tons each), 26 motor rail cars (capacity 2 to 10 passengers each), one motor rail trailer (capacity 16 passengers).

Traffic (annual): 1,000,000—3,000,000 bunches bananas, 1,000 tons miscellaneous freight, 70,000-120,000 passengers.

Financial (1944)—Operating expenses: $200,000 (U. S.),

THE GOLFITO DIVISION is a new line (1941) connecting the banana region near Palmar with the port of Golfito. The main line is 52 miles long, and there are 59 miles of auxiliary track. The gage is 42 inches.

Permanent way and structures—Maximum curvature: 8°. Maximum gradient: 1 percent compensated. Ballast: Round stone. Ties: Imported creosoted black gum and pine. Rails: A.S.C.E. 70 pounds per yard. Bridges: Over Coto, Esquinas, and Piedras Rivers, among others, for loading E-40. Tunnels: None.

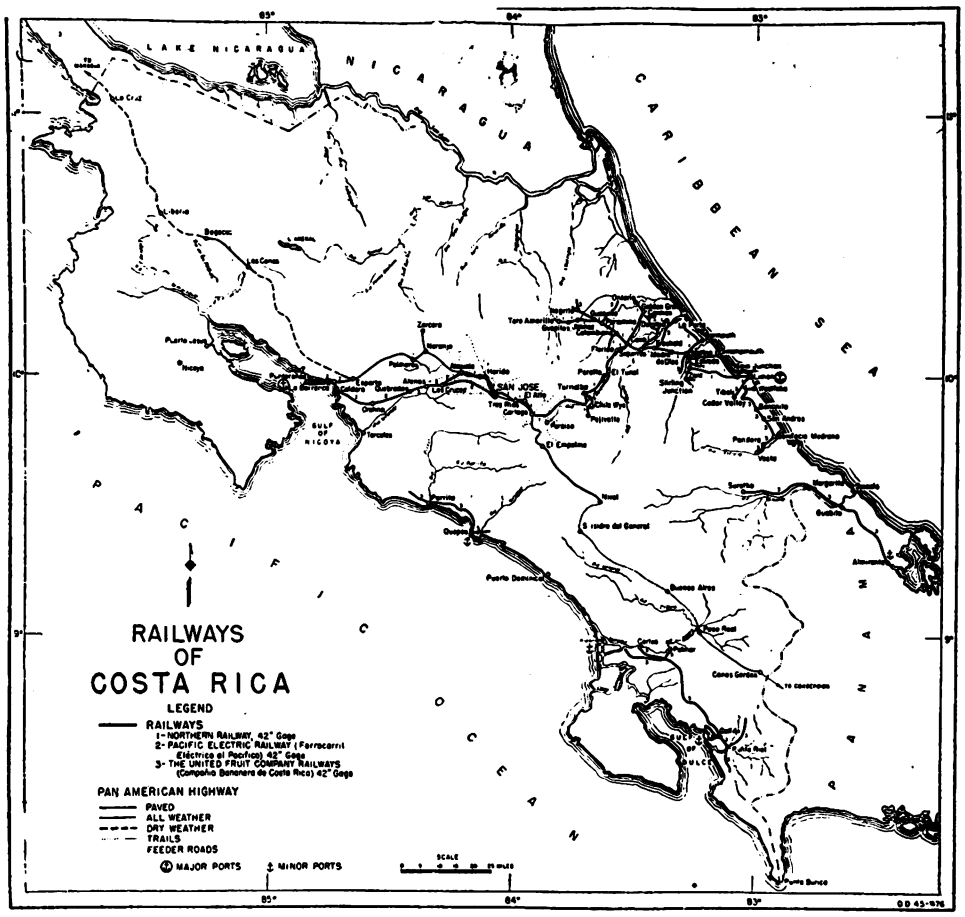
Facilities: Machine shop, engine shed, power plant, yard (about 300 cars): Golfito.

Equipment (1944)—Locomotives: 10 oil burners (average tractive effort 10,874 pounds), 3 diesel (177 HP). Freight cars: 32 box (capacity 15 tons each), 85 gondolas or ore (capacity 25 tons each), 86 flat (capacity 21 tons each), 9 diesel oil tank (capacity 7,000 gallons each), 236 banana (capacity 10 tons each), 12 miscellaneous (probably including work cars—capacity 15 tons each). Passenger cars: 2 coaches (capacity 52 passengers each), 22 motor rail (capacity 5 passengers each).

Traffic (1944)—35,000 tons bananas (estimated), 3,500 tons other freight (estimated), 71,238 passengers. Average fare: $0.4576 (U. S.) per passenger-mile.

Financial (1944—Operating revenues: $29,667 (U.S.) Operating expenses: $296,348 (U. S.).

NATIONAL ELECTRIC POWER & LIGHT COMPANY *(Compania Nacional de Fuerza y Lus)*. This streetcar company, the only one in Costa Rica, is a subsidiary of the Electric Bond and Share Company. It operates two lines, one from the San Jose airport through the center of the city to San Pedro, and the other



from the center of San Jose to Guadalupe, a town about 7 miles away. The purchasing representative is Ebasco International Corp., Agent, 2 Rector Street, New York, N. Y. There are 6 miles of single track, of 42-inch gage.

Permanent way and structures—Maximum curvature: 45-ft. radius. Maximum gradient: 6.41 percent. Ballast: Broken stone. Ties: Steel and native wood. Rails: 50, 60, and 70 pounds per yard. Electrification: 600 volt D.C. Bridge: Over Costa Rica Railroad track. Tunnels: None.

Facilities: Repairshop and car barn: 21st Street between Central and First Avenues, San Jose. Substation: Same location, to convert A.C. 60-cycle current, supplied by electric system, to 600-volt D.C.

Equipment (January 16, 1945): 13 passenger cars in operation and 5 in reserve (seating capacity 30 each), 2 motor cars (weight 7 tons each). The cars are all wood, about 30 years old, and they have benches, rather than seats.

Traffic (1944): 5,706,392 passengers at an average of $0.0037692 (U. S.) per passenger-mile.

Financial (1944)—Operating revenues: 599,183 colones. Operating expenses: 502,205 colones. Fixed capital: 1,584,928 colones.

Employees (1944): 124.

The Railways of Panama

Panama has an area of 29,072 square miles, exclusive of the Canal Zone's 553 square miles. Its coastline is 477 miles long on the Atlantic side and 767 miles on the Pacific side. Two mountain ranges traverse the country. Situated close to the equator, Panama has a generally tropical climate and heavy railfall. In the mountains, however, both the climate and rainfall are more moderate.

Economy

Commercial and financial relations with the Canal Zone are the heart of Panama's economic system. Of a national income of $129,126,000 in 1945, 37 percent originated directly in the Zone. However, 60 percent of Panama's population is engaged in agricultural pursuits. The principal products are bananas, cacao, beans, coconuts, coffee, and sugar. Additional crops yield rice, corn, tobacco, cotton, and a wide range of tropical fruits and vegetables.

Other occupations are forestry and stock raising. Mining, especially of gold but including manganese, limestone, aluminum, coal, iron, and asbestos, and the manufacture of a few consumer goods are carried on to a limited extent.

Digitized by Google

Transportation

Panama's transportation system is densest across the famous isthmus. Besides the Canal, a highway and the Panama Railroad offer interoceanic transportation. Both east and west of the Canal Zone, however, there is no coordinated transport system. Except for the 13 miles of banana line operated by Antonio Tagaropulos, the railroads serve only the extreme west. Highways are not extensive; there are only a little more than 1,103 miles of roads of all types, and none east of Chepo. Tropical rains make river traffic hazardous. Airlines have become increasingly important with Panama City, Colon, and United States Government airports handling the traffic.

CHIRIQUI NATIONAL RAILWAY *(Ferrocarril Nacional de Chiriqui)*. This railroad is owned by the Panamanian Government. It operates out of David in the Province of Chiriqui, sending one line to Pedregal, another to Puerto Armuelles, and a third to Boquete with a branch to Potrerillos. The route length is 124 miles and the gage is 36 inches. Address: David, Chiriqui, Panama, Central America.

Permanent way and structures—Maximum curvature: 5° at Concepcion, 12° on the Boquete line. Maximum gradient: 3 percent at Concepcion, 5 percent compensated on the Boquete line. Ballast: Gravel, Ties: Creosoted. Rails: 55 to 70 pounds per yard. Signals: Manual. Bridges and culverts: 59. Tunnels: None.

Equipment (in operation 1944)—Locomotives: 2 diesel (of 8 tons each), 2 gasoline (of 12 tons each). Freight cars: 12 box (capacity 20 tons each), 20 flat (capacity 20 tons each), 2 oil tank (capacity 1,300 and 4,000 gallons), one refrigerator (capacity ¼ ton), 6 miscellaneous. Passenger cars: 7 coaches, 3 baggage (capacity 20 tons each), 14 diesel motor (capacity 7 to 32 persons each). Couplers: Standard Brakes: Hand. Note: The Republic of Panama has no railway equipment industry. Domestic production is limited to reconstruction and overhauling in the shops of all locomotives and rolling stock.

In November 1945 the Government purchased 123 used railroad cars in the United States for the Chiriqui National Railway, as follows: 24 flat cars, 14 open freight cars, 3 tank cars, 7 cabooses, 63 other freight cars, 4 motor rail cars, and 8 large trailers. The cost was reported to be $15,000 for all the cars.

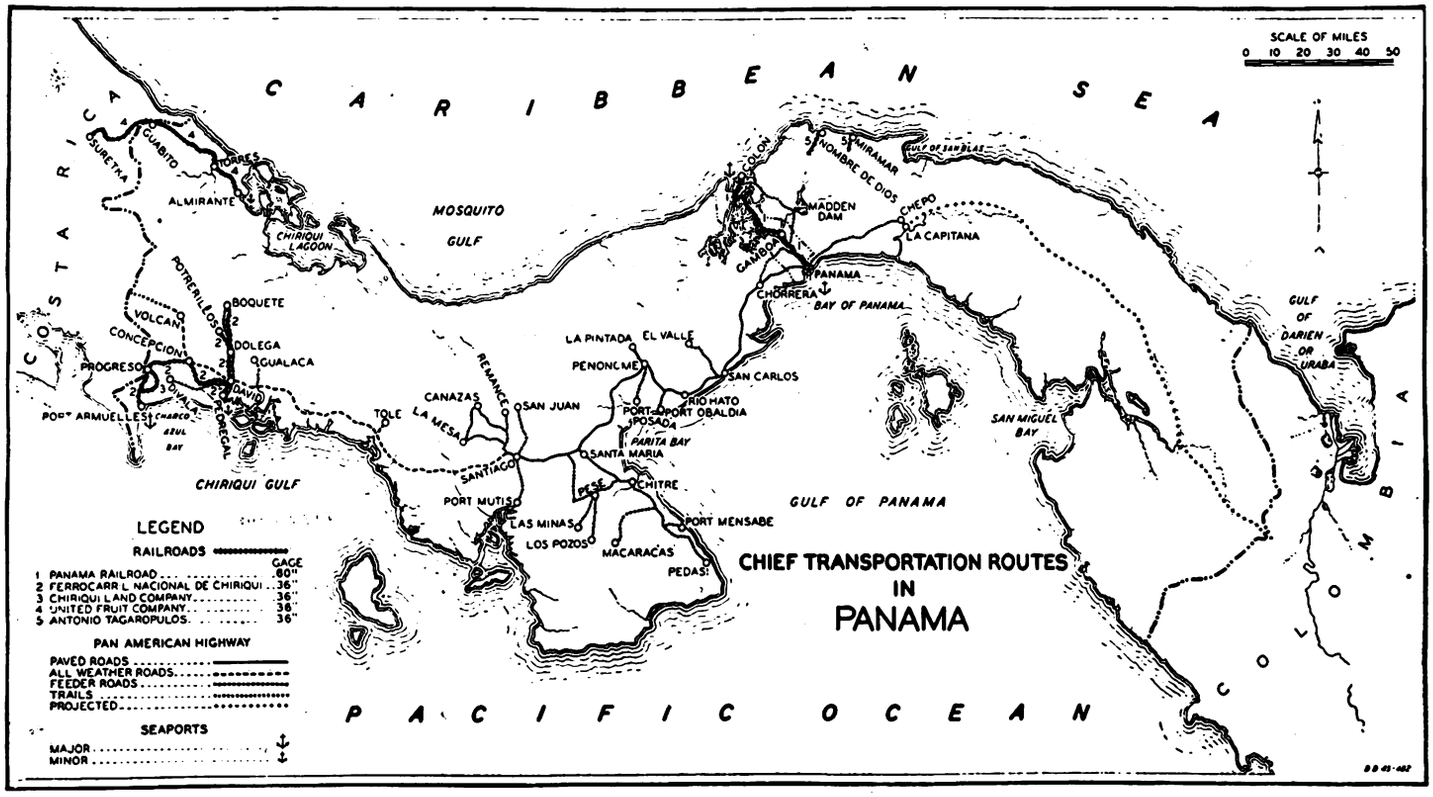
Traffic (1944): 41,405 tons freight, 544,532 passengers. Income: $4.05 per ton of cargo, $0.42 per passenger. (Note: The Panamanian balboa is linked to the dollar at 1 to 1.)

Financial (1944)—Operating income: $396,302. Operating expenses: $369,329.

PANAMA RAILROAD COMPANY. This company was incorporated in 1849 under the laws of the State of New York. Ownership passed to the United States Government in 1904, and since the beginning of Canal construction work, the company has been an adjunct to the Panama Canal. Its operations are supervised by a board of directors under the Secretary of War. As the operations of the railroad complement those of the Canal, the policy has been for the board of directors to elect as president of the Panama Railroad Co. the Governor of the Panama Canal.

In addition to the operation of the railroad, the enterprises conducted by the Panama Railroad Co. include: The loading, unloading, storage, and transfer of cargo for shipping interests at the terminal ports; the operation of wholesale warehouses, retail stores, and subsidiary manufacturing plants engaged in the supply of food, clothing, and other essential commodities to governmental agencies, employees, and their families; and the operation of coaling plants, two hotels, a dairy, and a laundry. The Company also operated a steamship line between New York and the Isthmus, but its three vessels were requisitioned by the Government during the war.

The main line of the railroad extends from Colon to Panama City, 51 miles. Terminal tracks at both terminals, intermediate tracks, and passing tracks belonging to the company, the Panama Canal, private terminal interests, and the United States Army and Navy, all of which are maintained by the Panama Railroad Co., bring the total trackage to 162 miles. The gage is 60 inches. The general offices of the company are located at 24 State Street, New York 4, N.Y. The general pur-



Digitized by Google

chasing officer is in Washington, D.C. The local officers are located mainly in Balboa Heights, Canal Zone, Central America.

Permanent way and structures—Maximum curvature: 7°. Maximum gradient: 1.25 percent. Ballast: Crushed rock. Ties: Creosoted pine and cypress. Rails: 70, 90, and 100 pounds per yard. Signals: Automatic block. Tunnel: One, 736 feet long, 15 feet wide, 21 feet 3 inches high. Clearance: 12 feet width for loads on main line, 11 feet 5½ inches height above top of rail at Balboa Heights station.

Equipment (June 30, 1945)—Locomotives: 17 road, 12 switch. Freight cars: 357 box, 209 flat (steel), 29 gondolas, 43 refrigerator, 8 stock, 2 banana, 7 oil tank, 96 Oliver dump (10 yard), 7 Oliver dump (12 yard), 6 cabooses, 6 ballast, 47 labor, 6 work, 5 garbage. Passenger cars: 22 first class, 14 second class, 7 baggage and mail, 4 motor, one parlor, one hospital, one pay. Miscellaneous equipment: 2 cranes one pile driver, one weed killer.

Traffic (year ending June 30, 1945)—590,610 tons revenue freight, 781,818 passengers. Revenue per ton-mile: $0.0827. Revenue per passenger-mile: $0.0239.

Financial (year ending June 30, 1945)—Operating revenues (including storage, demurrage, telegraph, rental of buildings, etc., and miscellaneous revenues from the operations of the railroad proper, as well as transportation revenues): $3,244,226. Operating expenses (in railroad operations): $2,213,623. Capital stock: 70,000 shares of $100.00 each.

UNITED FRUIT COMPANY. The Panama Division of the United Fruit Company operates from Costa Rica east over the border to the port of Almirante, serving the abaca and cacao plantations along the way. The length of the line is 173 miles, of which about 65.5 miles are in Costa Rica. The gage is 36 inches. The United Fruit Company's home address is One Federal Street, Boston, Mass., and the local address is Almirante, Bocas del Toro, Panama, Central America.

Permanent way and structures—Curvature: slight. Maximum gradient: 1.7 percent. Ballast: Gravel. Ties: Creosoted. Rails: 55 to 70 pounds per yard. Signals: Manual. Tunnels: None.

Facilities—Repairshop: Almirante; also a shed at Guabito.

Equipment (in operation 1944)—Locomotives: 8 steam, 10 diesel. Freight cars: 75 box (capacity 10 tons each), 127 flat (capacity 10 tons each), 6 tank (capacity 5,500 gallon each), 29 miscellaneous. Passenger cars: 8 coaches, 18 baggage (capacity 10 tons each), 30 motor rail. Couplers: Standard. Brakes: Hand.

Traffic, financial, and employment data are not available.

CHIRIQUI LAND COMPANY. This is a subsidiary of the United Fruit Company. It operates a 97-mile network of closely linked lines between Puerto Armuelles and the banana plantations. In addition, it operates its equipment, according to contract, over 15 miles of the Chiriqui National Railway between Puerto Armuelles and Progreso. The gage is 36 inches. The local address is Puerto Armuelles, Chiriqui, Panama, Central America.

Permanent way and structures—Maximum gradient: 1 percent. Ballast: Gravel. Ties: Creosoted; also native hardwood. Rails: 55 to 70 pounds per yard. Signals: Manual. Bridges; 162, in lengths of 15 to 150 feet. Tunnels: None.

Facilities—Repairshop: Armuelles.

Equipment (in operation 1944)—Locomotives: 9 diesel, one gasoline. Freight cars: 348 box (capacity 10 tons each), 105 flat (capacity 10 tons each), 3 tank (capacity 5,500 gallons each), 16 miscellaneous. Passenger cars: 2 coaches, 16 baggage (capacity 10 tons each), 25 motor rail (capacity 4 to 30 passengers each).

Traffic (1944): 40,992 tons of freight.

Passenger traffic, financial, and employment data are not available.

ANTONIO TAGAROPULOS RAILWAY. Two short lines of 36-inch gage are operated by Antonio Tagaropulos in connection with his banana plantations. No statistics are available.

☆U. S. GOVERNMENT PRINTING OFFICE: 1946—707796—61

Digitized by Google

cuments Room

Foreign & Domestic Commerce Bureau

Industrial Reference Service

U. S. DEPARTMENT OF COMMERCE, HENRY A. WALLACE, *Secretary*

Office of International Trade, ARTHUR PAUL, *Director*

Part 1. TRANSPORTATION and PUBLIC UTILITIES

Available in Parts Covering Selected Services and Commodities
Annual Subscription $1.50. Price this report 5 cents
For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. or any of the Department's Field Offices

Volume 4—Part 1 September 1946 Number 20

D 16501

INDIANA UNIVERSITY
1946
LIBRARY

Highways of Bolivia

By Elisha E. Early, Transportation and Communications Division, Special Services and Intelligence Branch

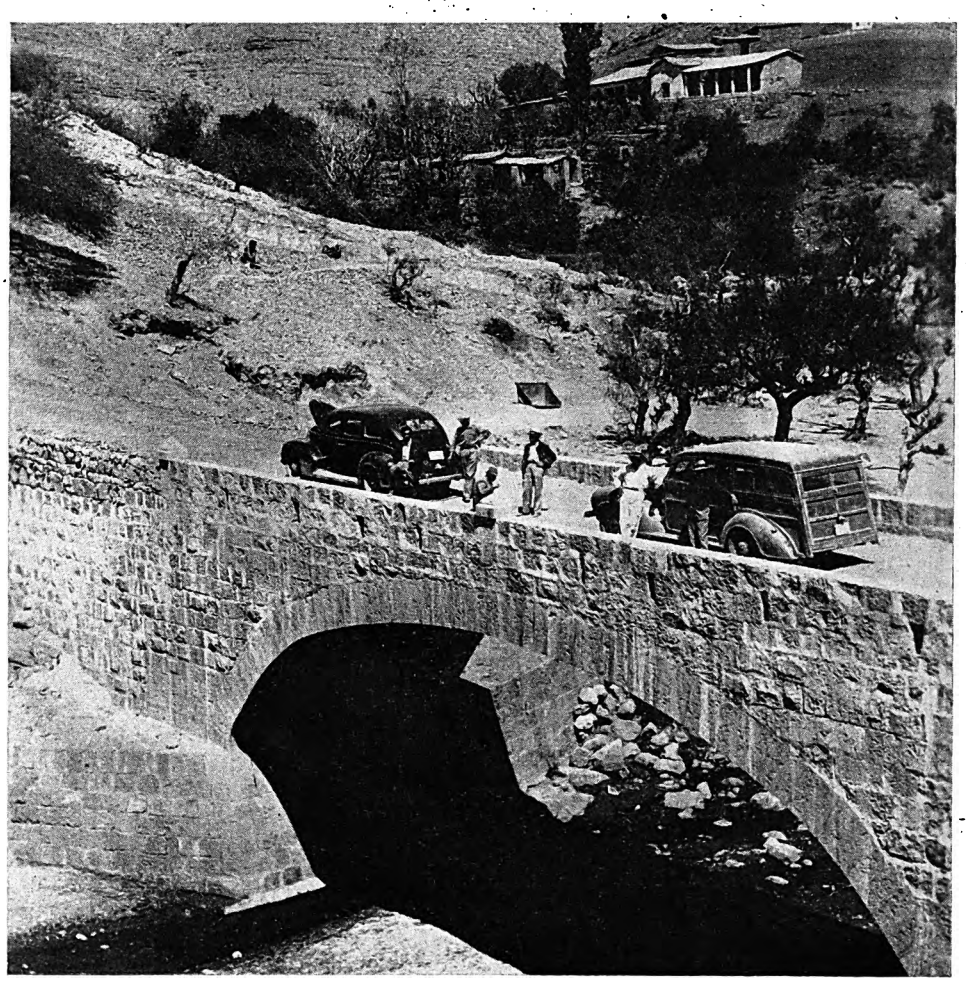
Based on reports of Foreign Service Officers, United States Embassy, La Paz, Bolivia

This publication is one of a series of Latin American highway reports designed to present data concerning the highway mileage and type of construction, adequacy of the highway system in terms of economic needs, and national policy in regard to new road construction. It is believed that this information will aid the motor vehicle, construction machinery, and equipment industries in making analyses of market potentialities in the countries, covered not only for a short range program in the immediate postwar years, when equipment that had depreciated and been retired during the war will be replaced, but also for a long-range program, when the present demand for replacements will have been met.

Basic information concerning economic and financial factors to be considered in analysing market potentialities are published in the International Reference Service. Information concerning motor vehicle registration, and construction machinery and equipment, will be published in the motive products and equipment series of the Industrial Reference Service.

General Information

The Republic of Bolivia, the third largest country in South America, has an area of 419,470 square miles and an estimated population of 3,457,000 as of August 1945. Bolivia lies in the north central section of South America and is bounded by Brazil to the north and east, Paraguay to the south and east, Argentina to the south, and Chile and Peru to the west. Much of the country is on the Altiplano, a lofty plateau 12,000 feet above sea level, 6,500 square miles in area and 86 miles in width. These highlands run between two great chains of the Andes, which traverse the country from north to south.



Stone arch bridge located on Route No. 41, (Potosi-Sama-Tarija)

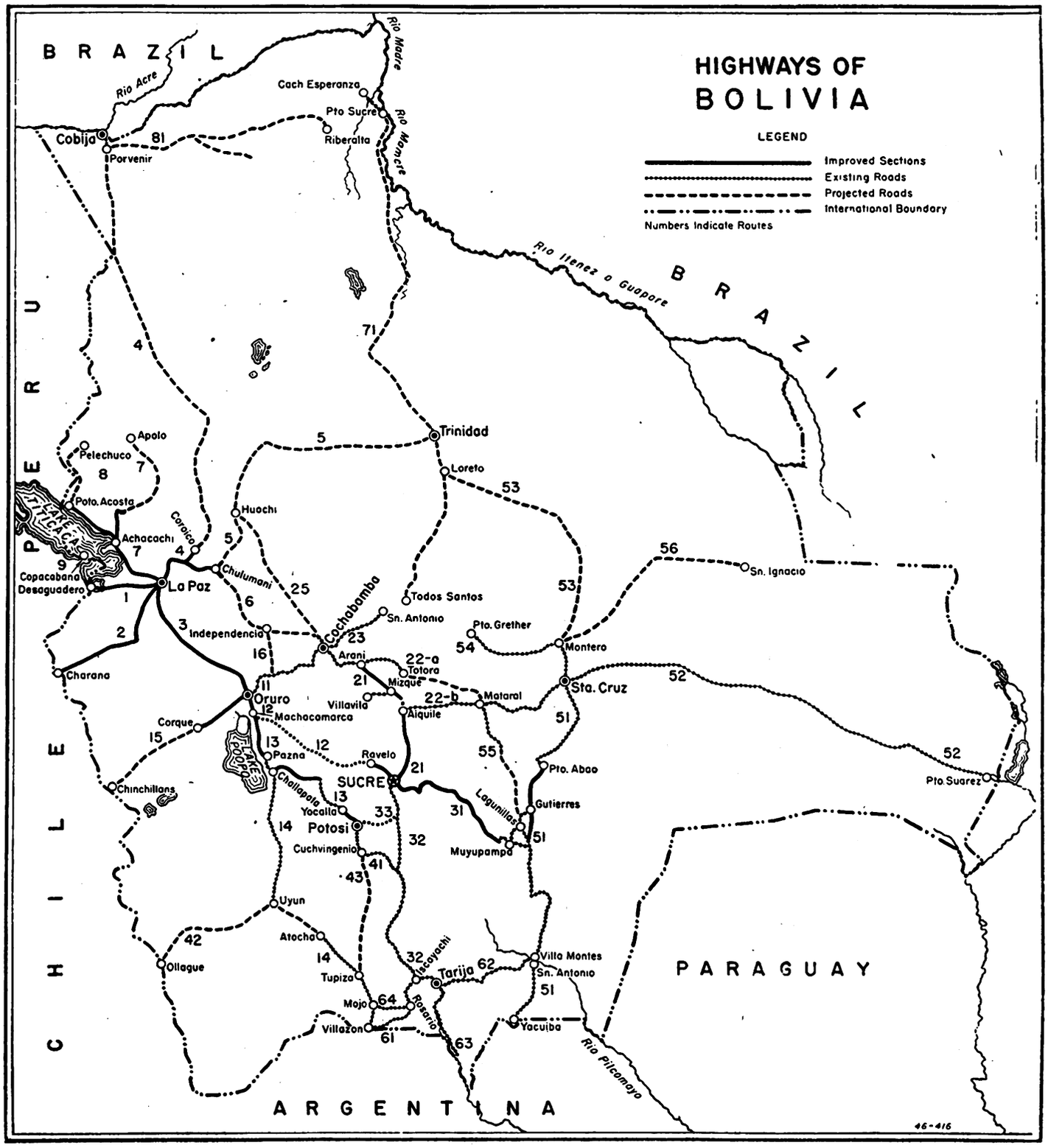
Sucre is the capital of the Republic; however, the seat of government is at La Paz. The monetary unit of Bolivia is the boliviano, which at the present time is equivalent to $0.0236, U. S. currency.

Digitized by Google

Three distinct climatic zones are prevalent in Bolivia, the tropical, temperate, and cold. In the lowlands the temperature is about 80° F., while on the plateau it is 40° F. There are two seasons, the wet and the dry; the wet season usually runs from December to May, and the dry from May to December.

Principal imports are cotton and wool textiles, wheat, flour, sugar, live animals, machinery, iron and steel products, lumber and other miscellaneous articles. The sources of supply of these imports are the United States, Great Britain, Chile, Argentina, and Peru.

Bolivia's exports consist of tin, wolfram, silver, copper, rubber, bismuth, antimony, lead, wool, hides, coca, quinine bark, coffee, and various other products. Tin constitutes 78 percent of the value of the Republic's total exports. Countries receiving these exports are Great Britain, the United States, and Argentina.



Digitized by Google

Highway Development

The highway system of Bolivia, as of 1945, consisted of 13,393 kilometers (8,322.3 miles) of unimproved roads and 1,000 kilometers (621.3 miles) of improved earth roads, giving a total of 14,393 kilometers (8,946.6 miles).

Highways have become increasingly important in Bolivia largely because of the inadequacy of the railroads. Truck traffic is very heavy throughout the country. Even though the highways can only be used during certain times of the year, they are the chief means of transportation. In the remote areas of Bolivia, where there are no railways, the highways are the only means by which certain produce may be moved. Consequently, roads, regardless of their condition, play a large part in the economy of the country.

Nevertheless, there has been little development of the highway system. Table 1 shows the highway mileage by construction types for the years 1942 and 1944. Note that there have been no major changes in mileage for these years.

Motor Transport Registrations

Official registrations of motor vehicles in Bolivia as of August 1941 totaled 5,745, broken down as follows: Passenger cars 2,233; buses 153; and trucks 3,359. As of January 1, 1946, official registrations for motor vehicles amounted to 6,348 distributed as follows: Passenger cars 2,348; buses 174; trucks 3,706; and motorcycles and three-wheeled vehicles 120.

A comparison of the above figures shows a very slight increase during the period, resulting from Bolivian imports from the United States.

TABLE 1.—*Road Mileage by Construction Types*

	1942		1944	
	Kms.	Miles	Kms.	Miles
Unimproved earth and nonsurfaced	13,193	8,198	13,393	8,322.3
Improved earth, sand clay, gravel, etc.	1,000	621.3	1,000	621.3
Waterbound macadam	none	none	none	none
Macadam, surface treated and penetration	none	none	none	none
Bituminous concrete and asphalt	none	none	none	none
Cement concrete	none	none	13	8.1 [1]
Block stone, wood, asphalt, and brick	none	none	none	none
Not specified	none	none	none	none

[1] Streets only.

Highway Expenditures

The appropriation covering road construction for 1943 was 45,437,000 bolivianos and was to cover the completion of the 1942 road program, as well as additional projects. In 1944 the budget for the calendar year provided a sum of 42,862,000 bolivianos to be used in the construction and maintenance of highways.

It has not been possible to break down either the 1943 or the 1944 appropriation figures to show portions allocated for construction and for maintenance. It is reliably reported that the customary practice is to use for construction the money allocated to maintenance or vice versa, when expedient.

Funds for the construction and maintenance of Bolivian roads are obtained by appropriations made by the Government. In some instances direct assessment is levied on the public through taxation on imports, property,

TABLE 2.—*Main Highways of Bolivia*

Highways and sections	Approximate length		Notes on highway conditions
	Kms.	Miles	
Route No. 1, La Paz-Desaguadero	110	68.4	Gravel and flat clay-silf lowland soil, dry weather only. Two-way.
Route No. 2, La Paz-Corocoro-Charna	235	146.0	Unimproved earth, all weather to Corocoro, thence to Charna dry weather only. Two-way.
Route No. 3, La Paz-Oruro	247	153.5	Improved earth to Km. 172, unimproved earth to Km. 247, open most of year. Two-way.
Route No. 12, Oruro-Sucre	365	226.8	Mostly unimproved, partly improved earth, dry weather only, mostly two-way, part one-way.
Route No. 21, Sucre-Cochabamba	347	215.6	Unimproved earth, crosses semiarid mountains, dry weather only, two-way.
Route No. 13 and part of Route No. 12, Oruro-Potosi	322	200.0	Unimproved earth, dry weather only, two-way.
Parts of Routes Nos. 12 and 13, Oruro-Uyuni	348	216.2	Unimproved earth, dry weather only, two-way.
Route No. 33 and part of Route 32, Potosi-Sucre	171	106.3	Unimproved earth, open most of year, two-way.
Route No. 41 and parts of Routes Nos. 32 and 61, Potosi-Tarija	386	239.8	Unimproved earth. open most of year to Camargo, dry weather only Camargo to Tarija, two-way.
Route No. 61, Tarija-Villazon	200	124.3	Unimproved earth, dry weather only, two-way.
Route No. 14, Villazon-Atocha	175	108.7	Unimproved earth, dry weather only, two-way.
Route No. 63, Tarija-Fortin Campero	255	158.4	All weather road first 100 kms., part of the road under construction.
Route No. 62, Tarija-Villa Montes	269	167.1	Improved earth, all weather road mostly two-way, part one-way.
Route No. 15, Oruro-Corque	95	59.0	Improved earth to Km. 18 thence unimproved, dry weather only, two-way.

TABLE 3.—*Developmental Roads for Opening up New Areas for Production of Essential Products of Bolivia*

Highway and sections	Approximate length		Notes on highway conditions
	Kms.	Miles	
Parts of Routes Nos. 7 and 8 La Paz-Puerto Acosta	203	126.1	Improved and unimproved earth, partly gravelled, open most of year, two-way.
Part of Route No. 7, La Paz-Sorata	162	100.7	Partly improved earth and gravel, remainder unimproved earth, open most of year, two-way.
Part of Route No. 7, Sorata (near) Tacacoma	74	45.9	Unimproved earth, open most of year, one-way.
Parts of Routes Nos. 4 and 5 La Paz-Chulmani	132	82.0	Both improved and unimproved earth, open most of the year, partly one and two-way.
No Route No., Chulumani-San Borja	438	272.2	Cattle trail.
Route No. 4, La Paz-Coroico	98	60.9	Both improved and unimproved earth in part, dry weather only, both in part one and two-way.
Part Route No. 2, La Paz-Corocoro	100	62.1	Unimproved earth, all weather, two-way.
Part Route No. 23, Cochabamba-Todo Santos	223	138.6	Unimproved earth, mule trail, dry weather only, both in part one and two-way.
Part of Routes Nos. 21 and 22, and all of Route 22 b, Cochabamba-Santa Cruz	750	466.0	Unimproved dirt roads dry weather only, two-way.
Part of Route No. 51, Santa Cruz-Camiri	328	203.8	Unimproved dirt road, dry weather only, two-way.
Part of Route No. 51, Camiri-Yacuiba	290	180.2	Unimproved earth, open most of year, two-way.
Part of Route No. 54, Santa-Cruz-Cuatro Ajos	130	80.8	Unimproved earth for 56 kms. All weather for 56 kms., two-way.
Route No. 54, Montero-Puerto Grether	125	77.7	Unimproved earth, dry weather only, two-way.
Route No. 52, Santa-Cruz-Puerto Suarez	625	388.4	Unimproved earth, two way.
Route No. 3 and part of Route No. 51, Sucre-Camiri	479	297.6	Unimproved earth, dry weather only, mostly two-way part one-way.
Part of Route No. 61 and all of Route No. 64, Tarija-Mojos	175	108.7	Unimproved earth, dry weather only, two-way.

Digitized by Google

and other miscellaneous items. Another form of tax levied on the people is the "Prestacion Vial," which is collected directly and is usually 40 bolivianos per person. Payment of this tax is obligatory (with some exceptions) for male inhabitants between the ages of 18 and 60 years, regardless of social or economic status. Those physically incapacitated and those belonging to the military are excluded from payment of the tax. The "Prestacion Vial" may be paid either in currency or in personal services. If the tax is not paid or worked out, a jail sentence may be imposed.

Planning and Financing

The "Direccion General de Vialidad" (Highway Department), under the Ministry of Public Works, by decree of December 4, 1941, is the local governmental agency charged with the administration, budgeting, planning, construction, and maintenance of highways in Bolivia, except for the program undertaken by the Bolivian Development Corporation. The activities of the latter organization in highway construction are thought to be too recent for further analysis at this time.

Pan-American Highway and Branches

Financing and Construction,

Unlike the progress made in constructing the proposed Pan-American Highway in other Latin American countries, Bolivia's contribution to this important highway communication scheme has not developed beyond the discussion stage. Even final decision as to which of several proposed routes will be chosen has not been reached, although public and official opinion seems to favor alternately the La Paz-Desaguadero and the Tiguina-Copacabana-Yunguyo routes as the more likely inlets into the country from the Peruvian highway system. At present, there is no indication as to when this much discussed project will be begun.

Main Highways

The difficulties associated with Bolivian highway transportation are primarily due to its undeveloped character. No reasonable classification of highways according to relative importance can be made. The roads and trails which comprise the "highway system" of Bolivia are so few and scattered over such a vast area that the whole network is necessary to the country's economy. Even those arteries serving the same communities as do the Bolivian railroads are useful as feeders to areas beyond the reach of the railroads.

Table 2 lists the main highways, point to point mileages, and the general condition of the roads.

Summary

Bolivian highways, those filling strictly local economic needs would serve the country better if they were maintained and repaired at regular intervals. It is significant that mules are still used in many sections of the country for moving produce. Even though an automobile route has been established between Cochabamba and Santa Cruz for nearly 12 years, the Indian "arriero" (mule herder) continues to transport products by trail because road transportation is so inadequate.

☆U. S. GOVERNMENT PRINTING OFFICE: 1946—707797—62

Digitized by Google

Documents Room
Foreign & Domestic Commerce Bureau

Industrial Reference Service

U. S. DEPARTMENT OF COMMERCE, HENRY A. WALLACE, *Secretary*
Office of International Trade, ARTHUR PAUL, *Director*

Part 1. TRANSPORTATION and PUBLIC UTILITIES

INDIANA UNIVERSITY 1 1 1946

Available in Parts Covering Selected Services and Commodities
Annual Subscription $1.50. Price this report 5 cents
For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., or any of the Department's Field Offices

Volume 4—Part 1 | September 1946 | Number 21

D 16351

Highways of Chile

Prepared by the Transportation and Communications Division
By Edgel C. Skinner, Transportation and Communications Division, Special Services and Intelligence Branch
Based on reports of Foreign Service Officers, United States Embassy, Santiago, Chile, and other official reports



Courtesy Pan-American Union

Cautin Bridge, Temuco, Chile

Digitized by Google

Highways of Chile

Outlook

Chile has more motor vehicles than the other three countries on the west coast of South America—Ecuador, Peru, and Bolivia—combined. However, until recent years, its surfaced highways suitable for motor traffic constituted a relatively small percentage of the total highway mileage. In 1934, only about 20 percent of the mileage was surfaced, compared with 39 percent in 1944.

Roads are still inadequate but expenditures for highways have increased notably. Of road expenditures totaling 1½ billion pesos [1] between 1929 and 1944, 58 percent were spent in the last 6 years of the period. Compared with 1940, expenditures increased 100 percent in 1944. As a result of their assigned share—24 percent of the total expenditures—under the 6-year public works program, started in 1945 primarily for the purpose of facilitating economic development, road expenditures will probably be even greater in the next few years.

General Information

Chile, with an area of 286,396 square miles is a ribbon of land about 109 miles in average width but almost equal in length (2,600 miles) to the breadth of the United States. As a consequence of its latitudinal expanse—from 18° to 56° south latitude—Chile has three contrasting climatic regions:

1. The northern desert, where nitrate and the bulk of the copper—which together accounted for about 12 percent of the national income in 1941—are found.

2. The Central Valley, which resembles Southern California in climate and supports 87 percent of the total population (estimated to number 5,237,400 in 1943) with its agriculture and industry.

3. The southern region, which is a replica of the coastal area of British Colombia and southern Alaska and contains a little-exploited source of many types of timber.

Among the Latin American countries, Chile ranks only after Argentina, Brazil, and Mexico in value of industrial output and number of persons employed in manufacturing. Roads, however, are considered a need in furthering the greater industrial and agricultural development needed for more economic stability in the postwar period. Particularly is this true of the southern region's lumber industry, the full development of which is dependent on the building of better roads.

[1] One peso is equal to approximately $0.0387.

It is estimated that only 22.8 percent of the arable land was cultivated in 1940. While this limited utilization of the land is also attributable to other factors (landholding system and lack of modern agricultural methods and machinery), a more complete system of roads would aid in stimulating wider crop planting and diversification.

Because of Chile's narrow width, every part is relatively near ocean shipping. In addition, there is a continuous north-south rail connection—between Pisagua, in the north, and Puerto Montt, in the south. With the development of an adequate merchant marine and a network of roads connecting all parts of the country with railheads and ports, transportation costs will be lowered, thereby facilitating industrial development.

Traffic is concentrated on a small portion of the highway mileage. Although allowance must be made for the fact that traffic was restricted by wartime conditions, a 1943 study showed that only 17 percent of the road mileage was used by more than 100 vehicles per day while 56 percent was used by less than 20 vehicles. The study estimated that the average daily traffic on the roads of the country was as follows:

Number of vehicles daily	Miles of road
More than 300	1,521
Between 100 and 300	3,139
Between 20 and 100	7,579
Less than 20	15,563

Principal Highways

The plan or design of the highway system depends upon the country's elongated shape. A north-south longitudinal road, Chile's section of the Pan American Highway, extends from the Peruvian border to Puerto Montt, a distance of 2,182 miles. From this road, which is in the valley between the coastal mountain range and the Andes, branch roads lead to ports and interior points. From Los Andes, 55 miles north of Santiago, the longitudinal road branches to pass through Caracoles to the Argentine frontier, where it joins Argentina's section of the Pan American Highway. Table 1 shows the length and road conditions of various sections of the Pan American Highway.

Highway Mileage and Surface Classifications

At the end of 1944, the highway system of Chile totaled 25,040 miles of roads suitable for vehicle traffic. The portion open to motor traffic is not known. However, on the basis of roads open to vehicle traffic, there was, in 1944, 1 mile of road per 11.4 square miles of territory. If the highway development among the 21 American Republics is measured comparatively by ranking the area per mile of road of each in 1944, Chile was tenth.

In 1944, surfaced roads in Chile totaled 9,667 miles, or 38.6 percent of the total mileage. As may be noted from the following tabulation, the emphasis of the Chilean road construction program has been on macadam, gravel, sand, and clay surfacing rather than on paving:

Road Mileage in 1920, 1934, and 1944, by Type of Construction

Type	Miles			Percent of total		
	1920	1934	1944	1920	1934	1944
Earth	15,535	19,722	15,374	98.0	79.5	61.4
Macadam, gravel, sand, and clay	311	4,851	9,079	2.0	19.6	36.3
Concrete and asphalt	.....	228	588	.....	0.9	2.3
Total	15,846	24,801	25,041	100.0	100.0	100.0

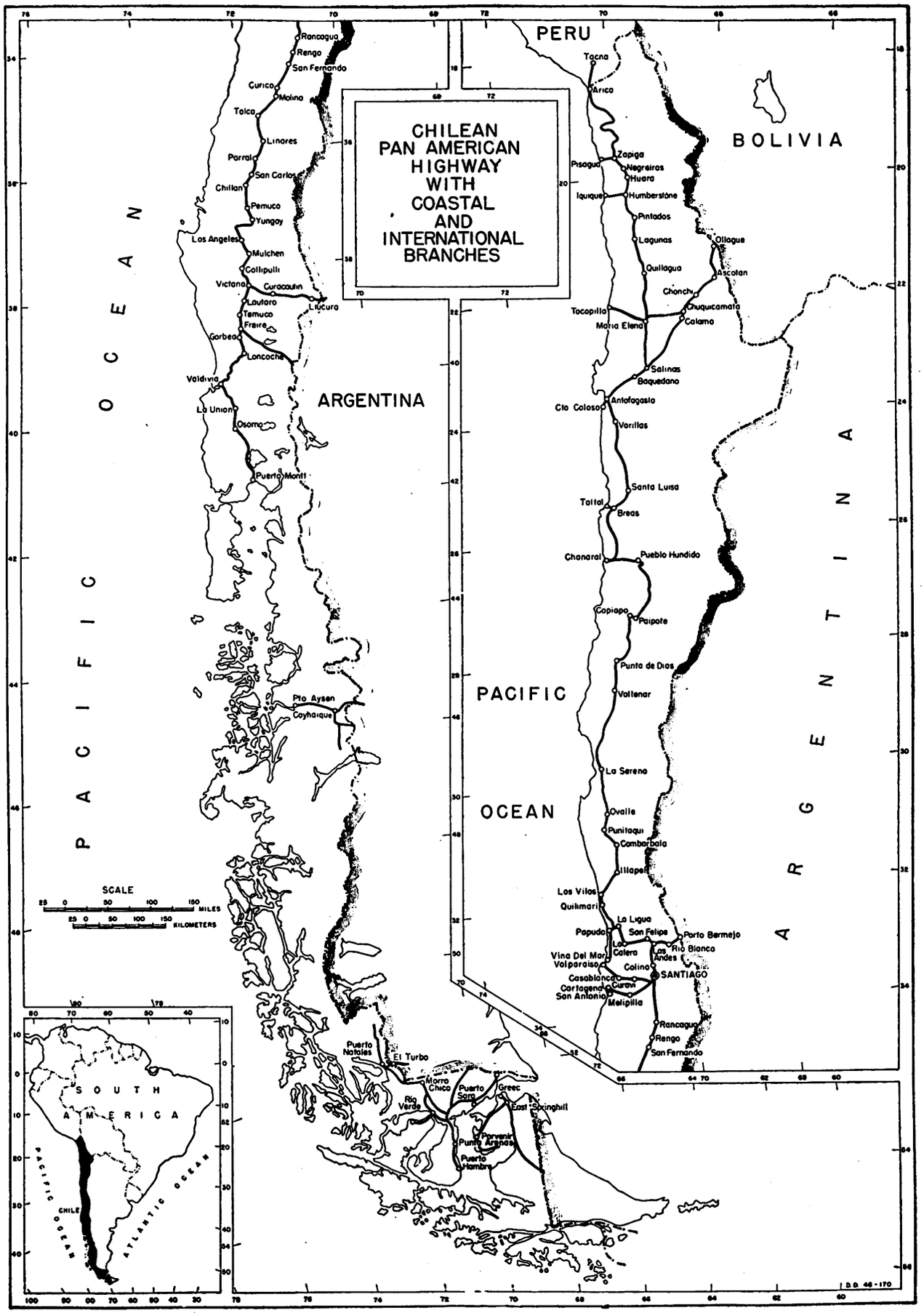
Since the northern section of the longitudinal road serves a sparsely inhabited desert region, branch roads, leading from it are scattered. However, they are important in moving personnel and light cargo to the mining camps. As the central area of the country is approached, the branches leading from the trunk road form a dense network. These roads serve an important agricultural area and facilitate the transport of food products. Near the cities of Santiago, Valparaiso, La Calera, San Felipe, and Los Andes, they serve the country's leading industrial area. It is in this region that most of the paved and other better types of road surfaces are found.

The forest regions, which are south of Puerto Montt and occupy about one-third the length of Chile, have no roads except for a few seasonal stretches around Puerto Aysen. Roads radiating from Punta Arenas, in the far south, serve the sheep grazing and packing industry of that region.

Highway Transport

Because of the continuous north-south rail services and the relative lack of surfaced roads, through highway transport services such as have

Digitized by Google



Digitized by Google

been developed in the United States are unknown. Many small companies operate trucks and busses from one town to another, but long-distance services are effected by rail.

Freight transportation.—Trucks have become economically important to the country as a short-haul transport medium for light cargo, particularly foodstuffs. As may be noted in table 3, the highway's portion of revenue freight of agricultural products increased 10 percent between 1937 and 1942 despite restrictions resulting from shortages of gasoline, tires, and motor parts during the war period. In 1938, the State Railways reduced rates on short hauls and increased them on long ones as a result of growing competition from highway transport.

Of 18,950 trucks registered in 1944, 46 and 14 percent were reported in the two central provinces, Santiago and Valparaiso, respectively. Before the war, it was in this central area that rail and highway transport were most competitive, particularly on port-inland movements, most notable of which were (1) Valparaiso-Santiago, (2) Valparaiso-Los Andes, (3) Valparaiso-Calera, (4) San Antonio-Santiago, (5) San Fernando-Santiago, and (6) Concepcion-Talcahuano. However, even outside of this area, highway transport was offering considerable competition to the railroads on short hauls.

To meet highway competition, the State Railways as early as 1932 introduced door-to-door transportation service on luggage, beds, and small packages for which trucks were engaged on a contract basis. In 1942, tariffs were placed in effect for this type of service on carload and merchandise shipments. Between some southern points and railheads, the State Railways in 1941, established a motor freight service with 30 tractor trucks.

Other firms engaged in trucking, however, are small. On the route between Valparaiso and Santiago—one of the most important in the country—the largest of the three firms operating had only four or five units in 1937.

Passenger transportation.—Although motor vehicle registrations in Chile are greater than in the other west-coast South American countries combined, the use of the passenger automobile has not been extensive enough to revolutionize the travel habits of the people. The horse is still widely used for both passenger and produce traffic. Of 27,850 passenger cars reported in a 1942 census, 51 percent were operated by private persons (including taxis) in cities; 37 percent, by agriculturists; and 12 percent, by diplomatic and government officials and physicians.

Prior to the war, busses and private passenger cars were more competitive than trucks to railroads in the central provinces, with the most important bus routes originating from Valparaiso and Santiago and running to towns and cities within a radius of 5 to 100 miles. During the war, however, the routes paralleling railroads were eliminated owing to the shortage of gasoline. From the larger northern and southern ports, passenger-carrying companies owning one or more units of equipment operate to inland towns.

TABLE 1.—*Pan American Highway in Chile—Distances and Conditions*

Highway and sections	Approximate length of section (miles)	Notes on road conditions
Peruvian frontier-Arica	13	Gravel, hard surface
Arica-Zapiga	129	Gravel and natural hard surface, but sandy in Gorges of Chaca Vitor, Camarones, and Chiza. Winding
Zapiga-Lagunas	106	Gravel, with tarred stretches. Flat and straight
Lagunas-Maria Elena	104	Sand to Quillagua; from Quillagua, gravel, hard-surfaced. Flat and straight
Maria Elena-Antofagasta	123	Tarred, first 60 miles; remainder, gravel, hard-surfaced, with tarred stretches
Antofagasta-Santa Luisa	123	Tarred, first 3 miles; gravel, hard-surfaced. Flat and straight
Santa Luisa-Copiapo	237	Most gravel, hard-surfaced. Winding
Copiapo-Vallenar	92	Gravel and sand, winding to Puntade Diaz; remainder, hard-surfaced and flat
Vallenar-La Serena	122	Natural earth but hard surface. Winding with gradual gradients
La Serena-Ovalle	57	Gravel. Wide, flat, and straight
Ovalle-Illapel	110	Sand, with hard foundation. To Punitaqui, flat; remainder, winding
Illapel-Los Andes	168	Earth and gravel. Paved between San Felipe and Los Andes
Los Andes-Argentine frontier	49	Gravel, with some stretches of loose earth. Mountainous with some steep grades
Los Andes-Santiago	55	Tarred and gravel
Total	1,488	

TABLE 2.—*Estimates of Rail and Highway Revenue Freight of Agricultural Products, 1937-43*

Year	Revenue freight (Metric tons)			Percent of total	
	Total	Rail	Highway	Rail	Highway
1937	1,656,392	1,414,519	241,873	85.4	14.6
1938	1,774,165	1,481,385	292,780	83.5	16.5
1939	1,935,846	1,592,806	343,040	82.3	17.7
1940	1,519,133	1,319,814	199,319	86.9	13.1
1941	1,595,799	1,225,847	369,952	77.8	23.2
1942	1,686,706	1,270,709	415,997	75.3	24.7
1943	1,815,100	1,377,627	437,473	75.9	24.1

SOURCE: Asociacion Chilena de Comerciantes e Industriales en Automoviles.

Motor vehicle registrations.—In 1945, before wartime shortages of gasoline and motor vehicles and parts affected normal importations, motor vehicle registrations totaled 54,459 units—36,310 passenger cars, 15,621 trucks, and 2,528 motor busses. Compared with the registration of 1931, this 1941 registration showed a total gain of 11,945 units, with the greatest gain (8,490) in the number of passenger cars (see table 3).

Between 1941 and 1944, total motor vehicle registrations decreased by about 6,100 units, with a decrease of about 9,200 units in passenger car registrations and a gain of 3,329 units in truck registrations. This gain in truck registrations may in part be accounted for by the conversion to small trucks of passenger cars removed from the road by stringent gasoline rationing.

The immediate future of the automotive transport industry in Chile would seem to be dependent in large measure on the development of the Government's policy in regard to duties and taxes on automotive equipment and allocation of foreign exchange for this purpose.

TABLE 3.—*Number of Motor Vehicle Registrations, 1931, 1941, and 1944*

Type	1931	1941	1945
Passenger cars	27,820	36,310	27,107
Trucks	12,831	15,621	18,950
Buses	1,863	2,528	2,601
Total	42,514	54,459	48,658

SOURCE: Direccion General de Estadistica, Santiago.

TABLE 4.—*Highway Expenditures, 1929–44*

[In million pesos]

Period	Amount for highways	Percent of total expenditures
1929–33	340.5	21.3
1934–38	327.2	20.5
1939–43	671.9	42.1
1944	257.4	16.1
Total	1,597.0	100.0

SOURCE: Ministerio de Obras Publicas y Vias de Comunicacion, Chile.

At present, import duties and taxes on automotive equipment of 3,000 pounds adds about 72 percent to the landed cost. As the duties and taxes are assessed on a weight basis, the delivery cost of heavy trucks and large busses has been too great in comparison with probable earnings. Thus the light truck and small bus are more commonly used. However, cost limits the market for them as well as for passenger cars for private use. Modification or elimination of automotive duties was under consideration in 1945.

The proportion of foreign exchange allocated to various imports is dependent both on supply and the Government's judgment as to the imports most important for the country's economic development. The exchange al-

Digitized by Google

located to automotive equipment prior to the war resulted in restricting imports as estimated 40 percent below demand.

Highway Construction Plans

Early in 1945, a bill providing for a 6-year public works program became law. The primary purpose of the program is the economic development of the country although it is also considered a measure for cushioning employment in the postwar period. Of the 3-billion-peso total, which it is estimated will be spent under authority of this law, 24 percent (720 million pesos) is earmarked for highways and bridges.

In 1945, 120 million pesos were appropriated under this law for road purposes. The funds from this appropriation allocated for road construction (70 million pesos) were assigned to the 25 provinces in amounts ranging from 2.5 to 5 percent of the total construction fund.

In addition, 17.5 and 6.6 million pesos were allotted for bridges and road-building machinery, respectively. It has been reported that within the 6-year period of the public works program, 155 million pesos (approximately $6 million) will be invested in road-building machinery and asphalt. Road-building machinery, amounting to 62 million pesos (approximately $2 million), is reported to be needed in 1946 and 1947.

In addition to the road program under the Public Works Law, a highway-airport construction program to be financed by gasoline taxes was under study in 1945. The proposed law would finance the program by imposing a gasoline sales tax of 60 centavos per liter. Also, it would allocate to the proposed highway-airport fund all of a gasoline reserve tax (14 centavos per liter) now in effect and a portion of a recently imposed higher customs surcharge on gasoline imports (estimated to yield about 24 centavos per liter). Chile has no commercially developed oil fields although, as a result of current explorations, a well was recently "brought in" in the Province of Magallenes.

The total tax on gasoline imports would be 98 centavos per liter. It was estimated that if the bill became law, the revenues would yield 135 million pesos in 1946. The bill provides that the limit of the amount to be spent for highway construction from the revenues derived under its authority will be 3 billion pesos. Estimates place the cost of a road system adequate for the realization of Chile's industrial and agricultural aims near 5 billion pesos.

In the period between 1929 and 1944, highway maintenance and construction expenditures totaled slightly more than 1½ billion pesos (table 4), of which 929.3 million pesos, or 58 percent, were spent in the 6 years, 1939-44. However, if revenues for road purposes under present and proposed laws should materialize, funds totaling almost two times the expenditures of the 1939-44 period may be available in the 1945-50 period.

On the basis of estimated revenues from property taxes levied for road purposes, estimated revenues from present and proposed gasoline taxes, estimated revenues from miscellaneous sources, and revenues expected under authority of the 6-year Public Works Law, funds available in the 1945-50 period may be projected as follows:

Source	Million pesos	Percent of total
Real estate taxes (6 years)	268	15.0
Gasoline taxes (5 years)	675	37.7
Gasoline taxes (1945)	35	1.9
Public Works Law	720	40.2
Miscellaneous (Chiloe Law, donations, motor vehicle tax	94	5.2
Total	1,792	100.0

The estimates seem conservative in view of the fact that after 1943 highway expenditures increased markedly—compared with 1940, expenditures in 1944 were about 100 percent greater and in 1945 showed an even larger increase. However, as 40 percent of the projected expenditures are to be derived from revenues authorized by the Public Works Law, the realization of revenues in the next 6 years is dependent on developmnts in the Government's fiscal policy during the postwar readjustment period. The problems involved in financing the 6-year Public Works Program are discussed in the next section.

Methods of Finance

In general, revenues for highway purposes are derived from revenues of real estate taxes; surcharges on import duties of gasoline and related petroleum products, motor vehicles, parts, and accessories; and appropriations from general revenues. In 1943 and 1944, revenues from an extraordinary tax of 1¼ cents a pound on copper were a major source of funds for the increased expenditures. An important part of the revenues of the public works program in 1945 and 1946, is to be from this source.

While all motor vehicles are subject to municipal license charges, the Departamento de Caminos (Department of Highways) of the Ministerio de Obras Publicas y Vias de Comunicacion (Ministry of Public Works and Communications), which is the authority for the planning, construction, and maintenance of roads, receives no funds from these license fees. The various communes use these funds in various ways. some employing the funds for local road maintainance. Generally, however, these funds enter the general treasury of the commune.

From 1930 until recent years, between 40 and 100 percent of the revenues for highway expenditures were derived from revenues collected under authority of the basic highway legislation, Law No. 4851 of March 11, 1930. In 1944, however, revenues allocated for roads (25 percent of the total) from the tax on copper and revenues derived from loans contracted under authority of Law 7200—known as the Economic Law—increased the portion of the revenues from other sources so that revenues designated by the Highway Law were only about 21 percent of the total highway expenditures. In the 1945 Highway Budget, allocations from revenues collected under authority of the Highway Law were about 26 percent of the total; allocations under authority of the Public Works Law, 37 percent.

TABLE 5.—*Highway Expenditures, 1940 and 1944, and Budget, 1945*

[In million pesos]

Sources of funds	Expenditures		Budget 1945	Percent of total		
	1940	1944		1940	1944	1945
Highway law (Law No. 4851, real estate, motor vehicle and fuels tax)	53.4	54.8	83.0	41.4	21.3	25.9
Loans and general state funds	67.1	149.9	174.7	52.1	58.2	54.4
Law 5903 (6-year program, 1935-40)	30.8	.....	.....	24.0	.....	.....
Corporacion de Fomento de la Produccion	10.0	.....	.....	7.7	.....	.....
Copper Law (Law No. 7434)	.....	64.6	.....	.....	25.1	.....
Public Works Law (Law No. 8080)	.....	.....	120.0	.....	.....	37.4
Economic Law (Law 7200) [1]	.....	44.9	20.0	.....	17.4	6.2
Chiloe Law (Law 5439)	.....	.7	.7	.....	.3	.2
Special road construction authorized by law	25.7	8.0	.....	19.9	3.1	.....
Variable expenses	.6	.5	.....	.5	.2	.....
Governmental quotas matching private donations	.....	31.2	34.0	.....	12.1	10.6
Reserve accounts [2]	8.4	37.1	46.0	6.5	14.4	14.4
Donations by private persons	.....	15.6	17.0	.....	6.1	5.3
Total	128.9	257.4	320.7	100.0	100.0	100.0

[1] Article 31 of Law No. 7200 authorizes the President of the Republic to issue Governmental obligations for the purpose of increasing road construction funds. Up to 50 percent of the funds which Law No. 4851 assigned to roads may be applied to the service of these loans.

[2] Law No. 5779 of 1935 makes available to the Departamento de Caminos of the Ministerio de Obras Publicas y Vias de Comunicacion during the following year those funds which were not already spent on December 31 of each year. Thus unexpended funds of this department do not pass to the General Income of the State at the end of the year but are carried in reserve accounts.

SOURCE: Ministerio de Obras Publicas y Vias de Comunicacion, Chile.

Digitized by Google

The Public Works Law, which in the next few years will play a very important part in the road program if revenues authorized under it materialize, has no specified minimum or maximum limit of expenditures. But statements of Government leaders indicate that an annual expenditure of 500 million pesos, of which 24 percent is designated by law for road purposes, is planned. This was the sum appropriated in the 1945 budget. Revenues are to be derived from three sources:

1. Seventy-five percent of the revenues from the extraordinary copper tax authorized in Law 7160 of January 20, 1942.

2. Appropriations from the national budget in amounts proposed each year by the President.

3. Domestic and foreign loans and credits which the President may contract up to the amount of 200 million pesos in 1945 and 300 million in each of the years between 1946 and 1950.

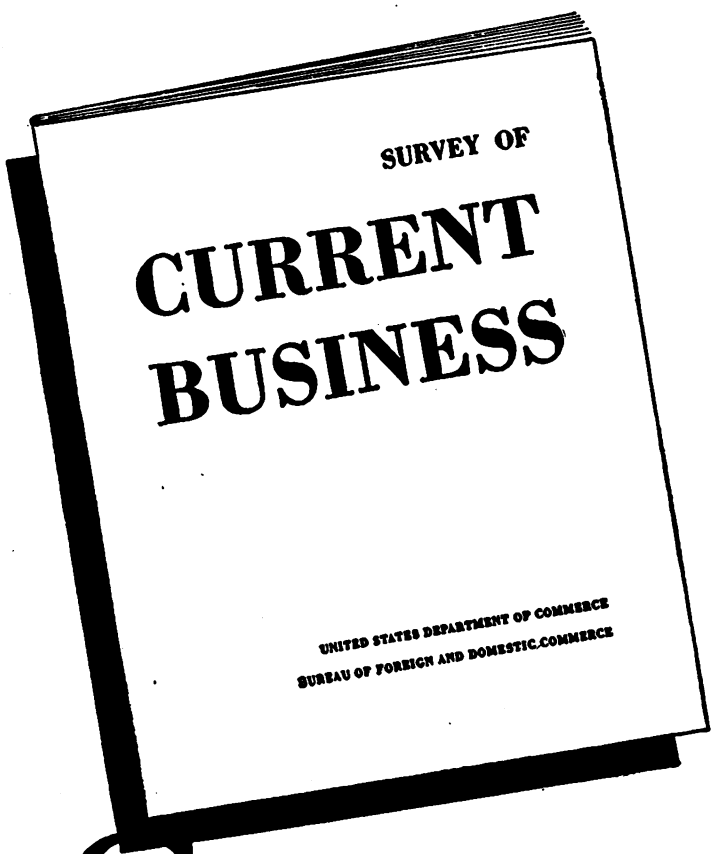
Though the Public Works Bill allocated 75 percent of the revenues from the copper tax for the full 6 years, the Government estimates rely on this resource for only the first 2 years of the program as the tax is dependent on the price of copper, the postwar trend of which is uncertain. However, as the receipts of the tax are being collected on the basis of 1944 and 1945 operations, the estimates of revenues available for public works, 266 and 100 million pesos in 1945 and 1946, respectively, seem conservative.

It has been estimated that after 1947, appropriations amounting to 200 million pesos will be needed from the general revenues to complete the planned expenditure of 500 million annually for public works. Though 200 million pesos were only about 5 percent of the National Budget in 1945, the ability of the Government to appropriate this sum for the public works level of the country's revenues in the program will depend on the general postwar readjustment period.

The loans authorized under authority of the law may be foreign or domestic. All bonds are to have an interest rate not above 7 percent and a cumulative amortization rate of not less than 1 percent annually. As the domestic bonds probably will be sold to the Central Bank when private capital markets do not absorb them, the loan provisions are the most reliable source of revenue for the program.

☆U. S. GOVERNMENT PRINTING OFFICE: 1946—707796—69

Digitized by Google



$2.00 per year

SURVEY OF CURRENT BUSINESS

THIS AUTHORITATIVE MONTHLY PERIODICAL makes easily available to businessmen over 2,200 comprehensive facts about production, stocks, orders, prices, sales, shipments, etc., of the industries of the United States by means of text, tables, charts, and index numbers.

A sample copy will be sent, on request to the
Bureau of Foreign and Domestic Commerce,
Washington, D. C.

$2.00 per year, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Digitized by Google

Domestic Commerce

written for

BUSINESSMEN . .

● Here is an authoritative monthly periodical written in the language of the American businessman. It is one of the principal organs of the Department of Commerce for disseminating information deemed of importance in maintaining a vigorous and dynamic free enterprise system.

● Domestic Commerce gives the reader an understanding of the progress and changing conditions of industry and business of the United States. Its writers are officials of this and other Government agencies, and specialists in the various subjects covered.

● Particular attention is given to developments in the field of post-war planning.

[*A sample copy will be sent you upon request to the Bureau of Foreign and Domestic Commerce, Washington 25, D. C.*]

$1.00 per year . . . from the Superintendent of Documents

U. S. GOVERNMENT PRINTING OFFICE • WASHINGTON 25, D. C.

Digitized by Google

ɔcuments Room

Foreign & Domestic Commerce Bureau

Industrial Reference Service

U. S. DEPARTMENT OF COMMERCE, W. AVERELL HARRIMAN, *Secretary*
Office of Domestic Commerce, H. B. MCCOY, *Director*

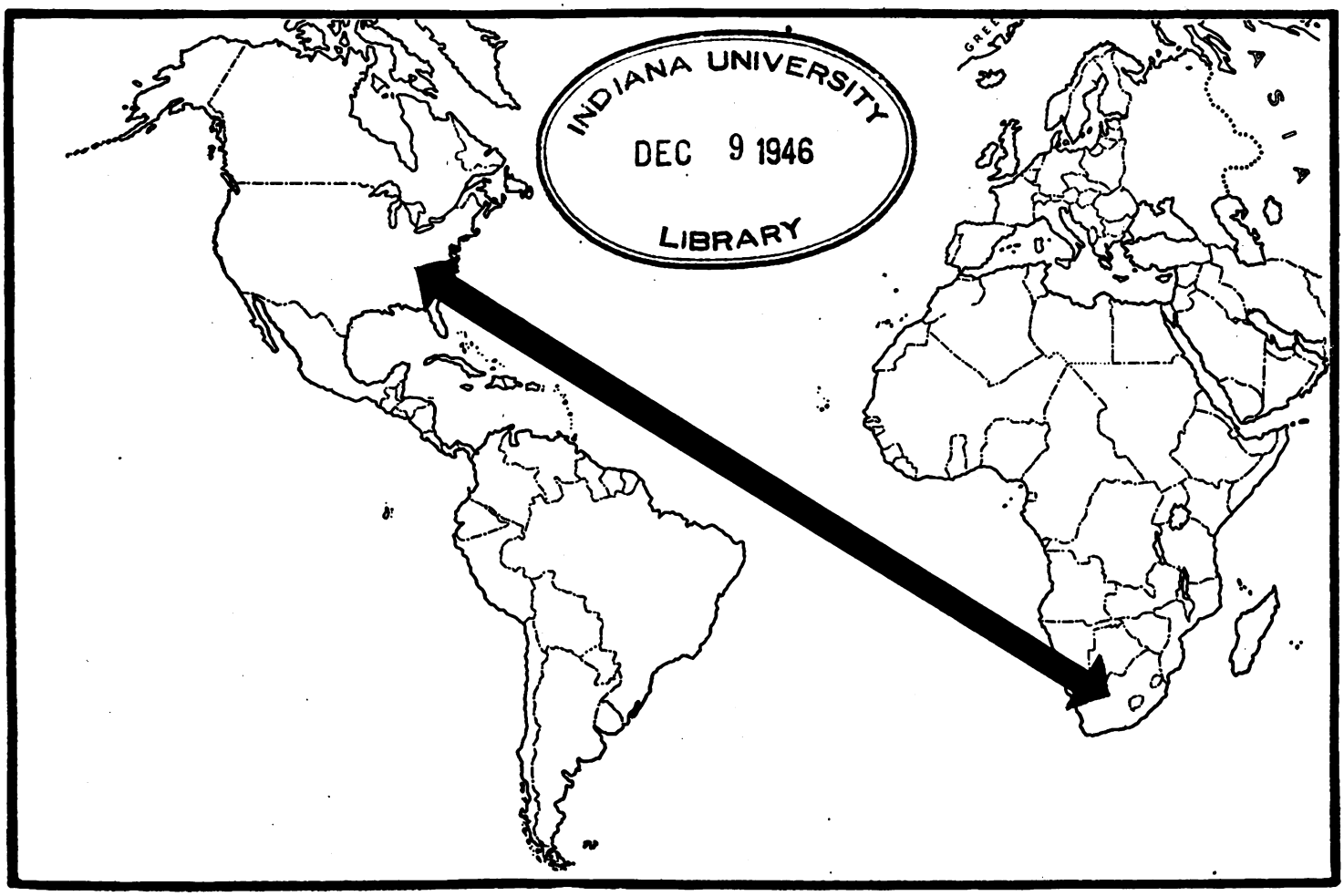
Part 1. TRANSPORTATION and PUBLIC UTILITIES

Available in Parts Covering Selected Services and Commodities
Annual Subscription $1.50. Price this report 5 cents
For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., or any of the Department's Field Offices

Volume 4—Part 1 November 1946 D 16796 Number 22

Air-Cargo Potentials Between the U. S. and the Union of South Africa

Prepared by Transportation Division, James C. Nelson, Chief



INDIANA UNIVERSITY
DEC 9 1946
LIBRARY

Digitized by Google

Air-Cargo Potentials Between the U. S. and the Union of South Africa

This is a revision of the study of the same title by Emerson R. Johnson issued through the Inquiry Reference Service in November 1944.

Other countries on which reports of this series have been issued to date include Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador, Guatemala, Honduras, Mexico, Paraguay, Peru, U.S.S.R., Uruguay, and Venezuela.

The Union of South Africa, situated at the southern tip of the continent of Africa is composed of four provinces, namely: Cape of Good Hope, the Orange Free State, the Transvaal, and Natal. The British protectorate of Bechuanaland lies to the north of the Union, while to the northwest is Southwest Africa, and to the northeast, Southern Rhodesia and Mozambique. To the east of the Union is the Indian Ocean while on the west is the Atlantic.

The seasons in South Africa are the opposite from those in the United States, the winter months being from June through August and the summer months, December through February. The climate in most of the Union is mild and equable.

The major industries of the Union are agriculture, mining, and manufacturing. Agriculture ranks first in the number of people employed. Mining, however, is the most important from the standpoint of wealth.

Maize or corn is considered the principal crop grown in the Union of South Africa. It is a staple article of food for the entire native population, and is widely used as fodder. Many fruits are grown in the Union, especially oranges, apples, peaches, plums, and grapes. The production of wool is one of the main activities of the Union, and from this industry much of the income of the country is derived. Gold and diamonds are the leading products of the mines, but of growing importance are iron, chrome, manganese, corundum, and asbestos.

The imports of the Union come mainly from highly industrialized countries, particularly the United Kingdom and the United States, and consist principally of iron and steel manufactures, machinery, wearing apparel, wood and paper products, cotton piece goods, and petroleum products.

The leading exports of the Union of South Africa have usually been wool, gold, diamonds, citrus fruits, maize, sugar, chrome, manganese, and wattle. These have been sent, mostly to countries of the British Empire, although in recent years there has been a marked decrease in their shares. Most of the produce of the Union at the present time is purchased by nearby African markets. Before the war the United Kingdom bought more than 75 percent of the Union's exports.

Transportation facilities are reasonably well developed. The Union is amply covered with its 11,772 miles of railroads, and a network of extension bus lines which are operated by the railways.

At the close of the fiscal year 1938-39 there were in the Union 92,143 miles of national highways which were distributed by provinces as follows: Natal, 6,600 miles; Transvaal, 33,392 miles; Orange Free State, 14,403 miles; and Cape of Good Hope, 37,748 miles.

The Union of South Africa has a mumber of good ports for ocean shipping. The principal ones are Cape Town, Port Elizabeth, East London, and Durban. Facilities for storage and repairs at these ports are excellent. There are no navigable rivers in the Union.

Air transportation in the Union is provided by a number of airlines. The leading three are British Overseas Airways Corporation (BOAC), Societes Anonyne Belge d'Exploitation de la Navigation Aerienne (SABENA), and the Southern Rhodesia Air Services (SRAS).

As of 1942 there were 136 airports (exeluding military), of which 10 had runways of more than 2,500 feet in length. Many have been improved since that time, and others have been added. The airport at Johannesburg has been designated as the international airport for the Union.

Background of Series

The appendix to this report explains the purpose of the studies and gives a description of the criteria applied in selecting the commodities classified as air-cargo potentials. It is suggested that readers consult that appendix for an explanation of the methods used and for factors to be considered in formulating conclusions based upon the data contained in the report.

In all cases, it should be noted that the statistics in the reports refer to air-cargo *potentials* and not to cargo actually carried by air in 1939. Failure to observe this fact has led to misinterpretation of the figures in the reports on some occasions.

Particular attention should be given to the bases for selection of commodities according to the following categories: Fragility, perishability, and style or obsolescence characteristics. Included under these headings are all commodities that might be so considered, regardless of value per pound. However, an analysis of the value per pound of individual commodities should nevertheless be made to determine whether all of the items can properly be considered as potential air cargo under the cost, competition, and equipment conditions of the immediate future.

For instance, it is unlikely that such cargo as grapes will be shipped in volume by air in the near future in view of their low value of approximately $0.04 per pound. The same consideration might also apply to such low-valued export items as beverage bottles and lard. However, all these commodities have been included in their respective categories for the sake of statistical completeness and because under some conditions they might be shipped by air.

Attention is called also to the schedule of values. These studies, aside from the three special groups, include only articles valued at $0.50 or more per pound. While the higher-valued articles probably would make up the major portion of the air cargoes, especially during the early development of this trade, values as low as $0.25 per pound are considered as indicating potential air cargo in similar studies and some cargo with a value per pound as low or lower actually does move by air under present conditions.

Potential Air Cargoes

The total value of United States domestic exports to the Union of South Africa in 1939 was $69,045,387.[1] Approximately one-fifth of these exports may be classed as air-cargo potentials. The items so classed had a total value of $13,441,097, a value of $0.67 per pound, and an estimated shipping weight of 20,011,410 pounds.

Imports for consumption from the Union of South Africa in 1939 totaled $27,750,171,[1] of which 64 percent, val-

[1] "Domestic exports" include exports of United States merchandise only; commodities imported and subsequently exported are included in "reexports" or "exports of foreign merchandise." "Imports for consumption" include commodities entered immediately upon arrival into consumption channels plus commodities withdrawn from bonded warehouses for consumption. "General imports" for any period differ from "imports for consumption" to the extent that entries into bonded warehouses are more or less than withdrawals from bonded warehouses. Statistics for domestic exports and imports for consumption were used here because they were published in the detail necessary to the purpose of the studies.

Digitized by Google

ued at $17,878,632, was potential air cargo.

Exports with possibilities for air shipment comprised 437 of the total number of export commodities (1,421). Of these potential air exports, 395 had a value of $0.50 or more a pound, including 79 which had an additional air-cargo characteristic. Also included as export air potentials are 14 perishables, 25 fragiles, and 3 items with style characteristics, all with values per pound below $0.50, together with one item having characteristics of both perishability and fragility and another with fragile and style factors.

Imports considered as potential air cargo numbered 39 of a total of 128 import commodities. Thirty-five of these potential air imports were valued at more than $0.50 a pound. In addition, four items with characteristics of perishability were listed as potential air imports which had values per pound of less than $0.50.

TABLE 1.—*Potential Air-Cargo Trade Between the United States and the Union of South Africa in Relation to Total Trade, 1939*

Summary item	Number of commodities	Shipping weight (pounds)	Value
Total trade with the Union of South Africa	1,549	(1)	$96,795,558
United States exports	1,421	(1)	69,045,387
United States imports [2]	128	(1)	27,750,171
Air-cargo potentials, total	476	20,877,435	31,319,729
United States exports	437	20,011,410	13,441,097
United States imports [2]	39	866,025	17,878,632
Percentage of total trade represented by air-cargo potentials	30.7	(1)	32.4
United States exports	30.8	(1)	19.5
United States imports [2]	30.5	(1)	64.4

[1] Not available.

[2] Includes diamonds valued at $14,273,708 shipped to the United States via London.

TABLE 2.—*Leading United States Glassware Exports to the Union of South Africa, 1939*

Class No.	Commodity	Pounds	Total value	Value per pound
5236	"Other" glass containers	5,356,951	$219,635	$0.04
5239	Table glassware, n.e.s.	1,225,278	66,165	.05
5234	Beverage bottles	1,021,263	19,404	.02

TABLE 3.—*Leading United States Style-Factor Commodities Exported to the Union of South Africa, 1939*

Class No.	Commodity	Pounds	Total value	Value per pound
3852	Dresses, skirts, blouses of rayon or other synthetic textile	839,591	$1,739,913	$2.07
0647	Women's and misses' boots and shoes	129,409	321,162	2.48
3853.1	Knit or crocheted dresses and ensembles of rayon or other synthetic textile	120,104	281,990	2.35
3742	Silk dresses, skirts, and blouses	93,278	264,721	2.84
0689	Women's and children's handbags, pocketbooks, and purses of materials other than leather	502,653	258,234	.51
3122	Women's cotton dresses and ensembles	156,051	212,243	1.36

Export Commodities

The chief commodities among the air-cargo potentials exported are textile manufactures and machinery. The largest single commodity exported is class No. 3852—dresses, skirts, and blouses of rayon or other synthetic textile, 1939 exports of which were valued at $1,739,913, with an average value of $2.07 per pound. Most of the articles included in classification No. 3852 would make especially good prospects for air transport because of the style factor which usually makes speed in transit highly desirable.

Other important commodities include: radio receivers ($1,218,319—value per pound $1.25), women's full-fashioned silk hosiery ($496,408—value per pound $3.65), and body-supporting garments ($486,180—value per pound $2.94).

Import Commodities

Diamonds shipped via London.—The most valuable commodity included in the list of air-cargo potentials is diamonds, 1939 imports of which were valued at $15,119,732. African diamonds, however are normally shipped to London where they are sold at auction. Those purchased by American buyers are then shipped to the United States.

Since the official trade statistics report country of *origin* of imported commodities rather than country of *shipment* these diamonds are credited to the Union of South Africa and not to the United Kingdom. Therefore, in discussing the prospective volume of air traffic between the Union of South Africa and the United States, diamonds shipped via London should not be included.

The value of diamonds so shipped in 1939 was estimated at $14,273,708. Subtracting this amount from the total of $17,878,632, leaves only $3,604,924 for air-cargo potential imports. It will be noted that this reduced figure is only about 27 percent of the estimated potential air-cargo exports, thus suggesting the prospect of an unbalanced trade.

Commodities shipped directly to the United States.—The elimination of diamonds shipped to the United States via London leaves undressed Persian-lamb furs in first place among import air-cargo potentials. Imports of these furs in 1939 amounted to 295,344 pounds, valued at $2,533,465, with an average value per pound of $8.58.

Diamonds shipped directly to the United States were valued at $846,024, according to statistics of the Union of South Africa, which figure is still large enough to warrant mention. Ostrich feathers and sausage casings (sheep, lamb, and goat) were imported in fairly large volume in 1939, totaling 45,601 pounds of the former, valued at $87,209, and 93,069 pounds of the latter, valued at $46,656.

Special Category Shipments

Perishable commodities.—The addition of commodities characterized by perishability does not greatly increase the total of air-cargo potentials, as 80 percent of the perishable *exports*, with a total value of $84,030, was already included among the commodities valued at $0.50 or more per pound. The leading perishable exports were glandular products (11,536 pounds — $25,333), cigars, (12,960 pounds—$19,182) and lard (116,043 pounds—$9,166). Total *imports* of perishables were valued at $16,023, with grapes (380,520 pounds—$14,265) constituting the principal item.

Fragile commodities.—Although the total shipping weight of fragile commodities exported is quite large (11,696,626 pounds), the items of glassware which make up the bulk of this weight should not be considered good air-cargo potentials because of their low value per pound. The itemization in table 2 provides an effective demonstration of this fact.

If importance is to be measured by the value of shipments, radio receivers, (class No. 7077) are by far the leading fragile commodity exported. Radio receivers exported to the Union of South Africa in 1939 had an estimated shipping weight of 974,655 pounds, a total value of $1,218,319, and an average value per pound of $1.25. Other important commodities were new standard typewriters ($200,901) and watches without jewels ($148,460).

There were no imports of fragile commodities in 1939.

Style-factor commodities.—Commodities which are subject to a decline in value because of style or obsolescence

Digitized by Google

amounted to 2,082,170 pounds, valued at $3,343,701 which were 25 percent of the total value of air-cargo potentials. The style-factor category consisted entirely of the following four groups of commodities: (1) Articles of wearing apparel; (2) motion-picture films; (3) phonograph records; and (4) advertising articles. Class No. 3852—dresses, shirts, blouses of rayon or other synthetic textile—was the predominant commodity, accounting for approximately one-half of the style-factor exports.

Actual Air Shipments

Data prepared by the Census Bureau, on the actual air traffic between the United States and the Union of South Africa are available for certain months of 1944 and 1945. Because of the wartime conditions prevailing during those months, however, these data do not give an adequate basis for predictions as to which commodities are likely to be profitable air cargo of the future.

Air-export data, available for the month of August 1944, show that items shipped by air from the United States to the Union of South Africa during that month were of very small volume. Of these, medicinal chemicals and glandular products offer good possibilities for profitable air shipment. United States air imports from the Union of South Africa for the fiscal year 1944-45 consisted mainly of diamonds, of which the major portion came by way of London. Of 21 entries of rough or uncut diamonds during a 3-month period of 1944, 18 shipments arrived via London.

Summary

If postwar air traffic between the United States and the Union of South Africa follows the general pattern indicated by prewar trade, it appears that it is destined to be essentially one-way.

In selecting air-cargo potentials on the basis of value per pound, the minimum for this study was set at $0.50 per pound. The distance between the United States and the Union of South Africa (approximately 9,000 air-route miles from New York to Johannesburg) may cause air-cargo charges to be so high that very few commodities valued at less than $1 or even $2 per pound, will be moved by air. Placing the minimum value per pound at $2 instead of $0.50 would cut more than half from the air-cargo potential exports as developed in this survey.

Subtracting the value of imported diamonds shipped via London from the total of $17,704,355, leaves but $3,430,647 as the total value of imports with a value of $2 or more per pound. While a few commodities valued at less than $2 per pound will no doubt move between the United States and the Union of South Africa, it appears reasonable to conclude that the bulk of the air-cargo traffic will consist of commodities valued at $2 or more per pound.

TABLE 4.—*United States Air Trade with the Union of South Africa for Specified Periods of 1944 and 1945*

Commodity	Shipping weight (pounds)	Value	Value per pound
Air exports: (August 1944)			
Military items	339	$1,147	$3.38
Photographs and blueprints	98	20	.20
Wrenches and parts, except automobile	60	72	1.20
Radio transmitting sets	46	155	3.37
Medicinal chemicals for prescription use	41	480	11.71
Miscellaneous items valued at $10 or less	6	4	.67
Glandular products	4	25	6.25
Total	594	1,903	3.20
Air imports: (July 1944–June 1945)			
Diamond bort	2,936	8,716,952	2,969.00
Diamonds, rough or uncut	598	33,612,596	56,208.00
Diamonds, cut but unset	9	352,044	39,116.00
Diamond dust	6	9,008	1,501.00
Earthy substance, plain	1	177	177.00
Diamonds, carbonado and ballast	1	14	14.00
Total	3,551	42,690,791	12,022.00

TABLE 5.—*Commodities Valued at $2 or More Per Pound Compared With Total Air-Cargo Potentials*

Item	Number of commodities	Shipping weight (pounds)	Value
Exports of commodities valued $2 or more per pound	101	2,073,929	$5,342,379
Air-cargo potential exports (as previously developed)	437	20,011,410	13,441,097
Imports of commodities valued $2 or more per pound	21	315,460	[1] 17,704,355
Air-cargo potential imports (as previously developed)	39	866,025	[1] 17,878,632

[1] Includes $14,273,708 worth of diamonds shipped to the United States via London.

Data Included in Tables

The accompanying tables give details of the air-cargo potentials itemized and grouped for convenience of reference. Table 6 summarizes, by value groups, items valued at $0.50 and more per pound considered to be air-cargo potentials. Table 7 lists perishables, fragile commodities, and those possessing a style factor. These categories have no lower limit as to value per pound. Tables 8 through 11 contain itemized lists of the commodities summarized in table 4 and 7, giving their weight, value per pound, and density.

Digitized by Google

TABLE 6.—*United States Trade with the Union of South Africa, 1939*

[Summary of commodities valued $0.50 or more per pound (category 1)]

Category 1	Commodities			Shipping weight		Value		
	Number	Percent of air-cargo potentials	Percent of total trade	Gross pounds	Percent of air-cargo potentials	Dollars	Percent of air-cargo potentials	Percent of total trade
Exports:								
Group, value per pound:								
1.....$0.50 to $0.99	169	38.7	11.9	5,142,467	25.7	3,473,336	25.8	5.0
2..... 1.00 to 1.99	125	28.6	8.8	3,142,702	15.7	4,041,627	30.1	5.9
3..... 2.00 to 2.99	45	10.3	3.2	1,762,896	8.8	4,068,964	30.3	5.9
4..... 3.00 to 3.99	18	4.1	1.3	220,386	1.1	771,242	5.7	1.1
5..... 4.00 to 4.99	8	1.8	.5	52,315	.3	216,773	1.6	.7
6..... 5.00 to 9.99	14	3.2	1.0	30,872	.2	191,131	1.4	.3
7.....10.00 to 24.99	9	2.1	.6	6,157	(1)	95,594	.7	.1
8.....25.00 and over	7	1.6	.5	1,303	(1)	38,675	.3	.1
Total $0.50 or more	395	90.4	27.8	10,359,098	51.8	12,897,342	95.9	18.3
Total air-cargo potentials [2]	437	100.0	30.8	20,011,410	100.0	13,441,097	100.0	19.5
Total exports to Union of South Africa	1,421	.....	100.0	(3)	.....	69,045,387	.....	.....
Imports:								
Group, value per pound:								
1.....$0.50 to $0.99	6	15.4	4.7	97,557	11.3	49,369	.3	.2
2..... 1.00 to 1.99	8	20.5	6.3	60,613	9	108,885	.6	.4
3..... 2.00 to 2.99	3	7.7	2.3	16,054	1.9	39,622	.2	.1
4..... 3.00 to 3.99	1	2.6	.8	3	(1)	9	(1)	(1)
5..... 4.00 to 4.99	1	2.6	.8	3	(1)	13	(1)	(1)
6..... 5.00 to 9.99	4	10.2	3.1	295,530	34.1	2,535,149	14.2	9.1
7.....10.00 to 24.99	4	10.2	3.1	51	(1)	756	(1)	(1)
8.....25.00 and over	8	20.5	6.3	3,819	.4	15,128,806	84.6	54.5
Total $0.50 or more	35	89.7	27.4	473,630	54.7	17,862,609	99.9	64.3
Total air-cargo potentials [2]	39	100.0	30.5	866,025	100.0	17,878,632	100.0	64.4
Total imports from Union of South Africa	128	.....	100.0	(3)	.....	27,750,171	.....	100.0

[1] Less than 0.05 percent.

[2] Includes commodities valued less than $0.50 per pound selected because of perishability, fragility, style factor, or obsolescense. These commodities are listed in tables 9, 10, and 11.

[3] Not available.

TABLE 7.—*United States Trade with the Union of South Africa, 1939*

[Summary of commodities possessing perishability, fragility, or style factor.]

Categories	Commodities			Shipping weight		Value		
	Number	Percent of air-cargo potentials [1]	Percent of total trade	Gross pounds	Percent of air-cargo potentials [1]	Dollars	Percent of air-cargo potentials [1]	Percent of total trade
		potentials [1]	trade	pounds	potentials [1]		potentials [1]	trade
Exports, value per pound:								
Perishable commodities (category 2):								
Less than $0.50	14	3.2	1.0	201,455	1.0	$15,375	.1	(2)
$0.50 or more	9	2.1	.6	41,845	.2	68,655	.5	.1
Total	23	5.3	1.6	243,300	1.2	84,030	.6	.1
Fragile commodities (category 3):								
Less than $0.50	25	5.7	1.8	9,284,416	46.4	479,988	3.6	.7
$0.50 or more	56	12.8	3.9	2,412,210	12.1	3,088,001	23.0	4.5
Total	81	18.5	5.7	11,696,626	58.5	3,567,989	26.6	5.2
Style-factor commodities (category 4):								
Less than $0.50	3	0.7	.2	166,441	.8	48,392	.4	.1
$0.50 or more	14	3.2	1.0	1,915,729	9.6	3,295,309	24.5	4.8
Total	17	3.9	1.2	2,082,170	10.4	3,343,701	24.9	4.9
Imports, value per pound:								
Perishable commodities:								
Less than $0.50	4	10.2	3.1	392,395	45.3	16,023	(2)	(2)
$0.50 or more	0	0	0	0	0	0	0	0
Total	4	10.2	3.1	392,395	45.3	16,023	(2)	(2)
Fragile commodities:								
Less than $0.50								
$0.50 or more	.....	.....	.....	.....	.....	.....	.....	.....
Total								
Style-factor commodities:								
Less than $0.50								
$0.50 or more	.....	.....	.....	.....	.....	.....	.....	.....
Total								

[1] See table 6 for figures on total air-cargo potentials.

[2] Less than 0.05 percent.

Digitized by Google

TABLE 8.—*United States Trade with the Union of South Africa, 1939*

[Group 1—Commodities valued from $0.50 to $0.99 per pound]

Class No.	Commodity	Shipping weight (pounds)	Value	Value per pound	Density
	EXPORTS				
0250	Hides and skins, other than cattle, calf kip, sheep, and goat	432	$296	$0.69	(1)
	Upper leather, except patent:				
0300	Cattleside, grain, black	4,408	3,467	.79	av. 18
0301	Cattleside, grain, other	20,710	11,083	.54	av. 21
0302	Cattleside, finished splits	37,607	21,725	.58	av. 21
0303	Cattleside, wax and rough splits	1,716	914	.53	av. 21
0326	Sole leather, other than bends, backs, and sides	533	384	.72	(1)
0353	Upholstery and automobile leather	40,346	38,018	.94	24
0600	Leather welting	23,256	14,326	.62	17
0648	Infants' and children's boots and shoes	6,502	4,249	.65	9
0650	Slippers for housewear, all leather	23,192	15,468	.67	9
0659	Discontinued models, old styles and second-hand shoes	699	437	.63	av. 12
0689	Women's and children's handbags, pocketbooks, and purses of materials other than leather	502,653	258,234	.51	5–9
0695	Luggage and related articles	21,061	17,932	.85	av. 7
0697	Belts (wearing apparel)	40,937	35,779	.87	8
0699	"Other" leather manufactures	15,259	13,535	.89	(1)
1256	Yeast	155	95	.61	22
2042	Druggists' rubber sundries, other than water bottles and syringes	35,466	30,111	.85	13
2046	Rubber toys and balls	19,066	13,918	.73	18
2049	Rubber erasers	6,913	4,348	.63	26
2064	Tires and tubes, other than automobile	89,443	44,905	.50	(1)
2095	Rubber thread	411	294	.72	34
2096	Gutta-percha manufactures	72	48	.67	(1)
2467	Flower seeds	9,782	8,474	.87	27
2622	Cigarettes	29,252	21,225	.73	22
3015	Cotton sewing thread	2,310	1,358	.59	21–34
3033.1	Cotton drills, twists, and warp sateens, wider than 40 inches	8,014	4,567	.57	32–36
3039	Other gray cotton cloth [2]	2,716	1,922	.71	32–36
	Finished cotton cloth, 40 inches wide and narrower:				
	Drills, twists, and warp sateens:				
3040	Bleached	3,240	1,946	.88	av. 29
3041.1	Dyed in the piece	40,093	35,343	.88	av. 29
	Printed	2,659	1,845	.69	av. 29
3041.2	Sheeting:				
3042.1	Bleached	5,999	5,354	.89	av. 29
3042.2	Dyed in the piece	2,310	1,202	.52	av. 29
3043	Printed	6,896	4,783	.69	av. 29
3046.1	Finished cotton cloth, wider than 40 inches—sheeting, bleached	9,837	6,293	.64	30
	Cotton printcloth yarn fabrics:				
3048	Carded broadcloth, bleached	294	209	.71	20–25
3049.1	Carded broadcloth, dyed in the piece	1,405	959	.68	20–25
3049.2	Carded broadcloth, printed	985	702	.71	20–25
3052.1	Printcloth, dyed in the piece	1,396	1,207	.86	35
3052.2	Printcloth, printed	24,916	15,030	.60	33
	Cotton colored yarn fabrics:				
3058	Suitings, twill-coverts, and cottonades	14,812	9,522	.64	25
3060	Chambrays, cheviots, and shirtings	18,686	12,539	.67	20–24
	Fine goods and combed cotton fabrics:				
3067	Voiles, organdies, lawns, and batistes, combed	1,546	1,212	.78	av. 10
3073	Marquisettes, combed	2,110	1,931	.92	av. 10
3079	Cotton and rayon mixtures (cotton chief value)	2,438	1,586	.65	12–18
3082	Cotton table damask in the piece	450	276	.61	25–33
3084	Cotton tapestries and other upholstery goods	2,477	2,029	.82	13–21
3087	Cotton plushes	1,393	1,203	.86	av. 15
3088	Other cotton pile fabrics	79	51	.65	10–21
3120	Men's and boys' clothing of woven fabrics [2]	25,062	18,704	.75	10–22
3140	Woven cotton belting for machinery	614	485	.79	37
3160	Cotton braids, trimmings, bindings, lacings, tape labels, and webbing	6,086	5,246	.86	15
3161	Other narrow fabrics [2]	5,531	3,053	.55	15
3176	Cotton bedspreads, plain, crinkle, dobby, and jacquard-woven	3,385	2,668	.79	av. 17
3181	Cotton curtains and draperies	439	307	.70	8
3189	Cotton house furnishings [2]	1,358	750	56	(1)
3191.1	Cotton bags, new	8,019	6,594	82	25
3399	Manufactures of flax, hemp, and ramie	5,123	4,892	95	(1)
3419	Cordage, except of cotton and jute, other than binder twine and manila	917	632	.69	25–39
3633	Wool yarn	186	145	.78	13
3699	Manufactures of hair, other than hair belt	4,623	2,376	.51	(1)
3849.9	Remnants and mill ends of rayon or other synthetic fiber	78	45	.58	31
3858.5	Braids, fringes, and narrow trimmings of rayon or other synthetic fiber	529	473	.89	12
3915	Pyroxylin coated or impregnated fabrics	27,682	18,201	.66	34
3918	Waterproof outer garments	16,826	12,000	.71	av. 12
3940	Hat braids, strips, and sheets	61	43	.70	14
3942	Harvest hats of straw, palm leaf, etc	5,997	3,204	.53	3–10
3990	Elastic webbing, over 1½ inches wide	4,241	2,298	.54	av. 22
5291	Chemical glassware	2,791	2,570	.92	6–9
5412	Wheels of artificial abrasives	24,245	15,936	.66	32–69
5455.5	Asbestos packing	33,064	20,175	.61	23–56
5474	Brushes and stock of carbon or graphite	21,211	10,648	.50	30
5478	Lighting carbons	24,291	17,105	.70	43–81
5513	Manufactures of mica (other than ground mica)	1,094	710	.65	av. 64
6114	Scissors, shears, and snips	9,882	9,735	.99	44
6115	Table cutlery, including forks	5,115	3,229	.63	30
6154	Hacksaw blades	21,425	19,231	.90	135
6156	Saws, crosscut, hand, back, and other saws [2]	64,714	39,023	.60	21–30
6157.1	Augers, bits, gimlets, and counter sinks, woodworking	13,340	7,133	.53	40–100
6169	Hand-operated pipe stocks and dies, diestocks, dies, and bushings	30,304	22,122	.73	53–120
6170	Hand-operated pipe cutters and other metal-cutting tools [2]	8,660	4,815	.56	53–120
6172	Slip-joint pliers	2,176	2,156	.99	50–90
6178.9	Other hand tools and parts	366,724	364,524	.99	28–141
6179	Padlocks	119,098	70,647	.59	54–96
6181	Cabinet and other locks	21,719	12,311	.57	21
6182	Hinges and butts of iron or steel	11,793	5,894	.50	35–90
6303	Plates, sheets, bars, strips and rods of aluminum	80	70	.88	76–110
6304	Aluminum foil	5,965	3,337	.56	28–59
6454	Pipe fittings and valves of brass and bronze	26,963	13,562	.50	28–112
6456	Plumbers' brass goods	15,598	9,844	.63	63–108
6469	"Other" hardware of brass or bronze	34,186	19,076	.56	10–90
6958	Silver-plated knives, forks and steak sets	445	337	.76	17–43
6959	Other silver-plated ware	2,610	2,122	.81	17–43
7000	Direct-current generators	4,974	2,651	.53	
7011	Self-contained lighting outfits	204,361	103,611	.51	(1) 51
7019	Capacitors, ½ kilovolt ampere and larger	61,727	39,999	.65	120–160
7027	Rotating converters, under 300 kilowatts	25,655	17,394	.68	
7028	Complete battery chargers	57,394	31,050	.54	15–26

See footnotes at end of table.

Digitized by Google

TABLE 8.—*United States Trade with Union of South Africa, 1939*—Continued

[Group 1—Commodities valued from $0.50 to $0.99 per pound]

Class No.	Commodity	Shipping weight (pounds)	Value	Value per pound	Density
	EXPORTS (continued)				
7030	Feeder voltage regulators	4,860	$ 3,086	$ .63	100–140
7031	Switchboard panels, except telephone	36,261	19,037	.52	4–24
7034	Fuses	18,747	12,617	.67	22
7035	Watt-hour and other measuring meters	7,072	6,004	.85	37–64
	Starting and controlling equipment and parts:				
7048	For industrial motors	93,431	46,342	.50	(1)
7049	For electric railway and vehicle motors	15,668	8,492	.54	(1)
7056	Portable electric tools	69,882	47,939	.69	24–140
7060	Flashlight cases	66,046	36,193	.55	10
	Electric incandescent lamps:				
7064	Metal filament lamps, other than for automobiles, flashlights, and Christmas trees	25,799	17,363	.67	5–12
7065	Other	9,619	4,771	.50	4–12
7066	Searchlights and airport beacons	256	174	.68	8–15
7069.1	Electric domestic vacuum cleaners	26,316	13,895	.53	8–33
7069.3	Electric domestic vacuum cleaner parts	1,555	897	.58	8–33
7073.5	Other domestic electric utensils	112,474	57,137	.51	6–11
7075.5	X-ray apparatus and parts, other than X-ray tubes	45,552	35,804	.79	14–60
7089	Bells, buzzers, annunciators, and alarms	16,845	15,582	.93	av. 24
7095	Sockets, outlets, fuse blocks, lighting switches, and parts	44,404	36,589	.82	25
7311	Rock drills	163,889	108,681	.66	16–157
7458	Portable and hand- or foot-operated metal-working machines and parts (other than portable pneumatic tools)	107,582	63,366	.59	15–69
7471	Chucks for machine tools	2,008	1,857	.92	42–78
7691	Ball bearings and parts, except balls	11,859	9,250	.78	50–120
7692	Roller bearings and parts, except rollers	4,772	3,694	.77	50–120
7760	"Other" accounting and calculating machines, including used and rebuilt	1,609	1,590	.99	13–28
7763	Duplicating machines, parts, and supplies for	15,138	8,583	.57	13–20
7767	Parts for cash registers	7,006	6,831	.98	23
7770	Typewriters, standard, new	242,049	200,901	.83	19
7772	Typewriters, portable, new	66,824	54,662	.82	24
7774.1	Typewriters, rebuilt	35,482	19,941	.56	20
7774.9	Typewriters, other, used	13,561	8,516	.63	20
7795	"Other" printing and typesetting machinery, parts, and accessories	132,361	85,770	.65	23–55
7916	Automotive piston rings	23,370	19,257	.82	24
7921	Spark plugs	25,408	23,325	.92	49
7954	Motorcycle parts and accessories (except tires)	13,930	8,734	.63	(1)
8059	Coal-tar colors, dyes, stains, and color lakes	7,930	4,188	.53	18–58
8120	Biologics for animal and veterinary use	7,495	6,618	.88	(1)
	Druggists' nonproprietary preparations:				
8124	Elixirs, tinctures, fluid extracts, ampoules, and similar liquid solutions	54,474	27,237	.50	25
8130	Medical and reagent chemicals	22,118	16,367	.74	23
8149	Corn and foot remedies	8,276	6,546	.79	14
8152	Salves and ointments for burns, cuts, skin diseases, insect bites, inflammation, etc	16,248	10,902	.67	33
8180	"Other" proprietary medicinal preparations	65,922	38,037	.58	30–45
8265	Cellulose acetate sheets, rods, or tubes and other unfinished forms	21,545	13,240	.61	14–50
8296	Pectin	10,830	7,747	.72	28–52
8742	Face and compact powder	101,667	58,865	.58	19–50
8757	"Other" cosmetics	27,532	20,236	.73	av. 30
8766	Perfumery and toilet waters	1,457	1,412	.97	25
9003	Box cameras (set focus)	17,666	14,467	.82	17–40
9011	Motion-picture sound equipment (reproducing)	69,700	65,309	.94	av. 11
	Sensitized films, not exposed:				
9125	Cartridge or rolls	236,989	163,058	.69	26
9126.1	Packs of sheets, X-ray	18,542	10,439	.56	23
9126.9	Packs of sheets, other	37,681	18,888	.50	23–41
9129	Photographic paper	11,155	6,597	.59	20
9140	Photographic apparatus and supplies [2]	48,842	37,804	.77	av. 27
9155	"Other" dental equipment and supplies	63,470	39,669	.63	8–62
9245	Band instruments—percussion	5,421	5,014	.92	2–14
9295	"Other" musical instruments	551	548	.99	2–27
9297	Musical instrument parts and accessories [2]	41,331	22,195	.54	8–18
9304	Pencils, other than mechanical	16,013	11,155	.70	17–30
9319	Penholders and parts	3,120	1,660	.53	14
9392	Carbon paper	18,918	13,714	.72	36
9420	Fishing rods	10,745	7,273	.68	14–23
9421	Fishing reels	7,589	6,078	.80	(1)
9422	Other fishing tackle and parts	17,022	12,307	.72	av. 30
9434	Foot, basket, base, tennis, and other balls (except golf balls)	595	550	.92	9–30
9472	Rifles	34,365	17,467	.51	26–39
9490	Shot shells	14,850	12,372	.83	76
9565	Playing cards	62,221	44,133	.71	48
9571	One-day alarm clocks	135,700	111,942	.82	26–40
9591	Time-recording devices and parts	10,932	8,527	.78	(1)
9793	Gasoline pressure lamps, lanterns, and parts	6,695	3,716	.56	3–22
9813	"Other" synthetic resin products	336	235	.70	(1)
9820	Manufactures of all other compounds of cellulose [2]	10,582	7,926	.75	(1)
9826.9	"Other" brushes, including industrial	9,047	6,542	.72	29
	Total	5,142,467	3,473,336	0.68	.....
	IMPORTS				
0034.0	Sheep, lamb, and goat sausage casings	93,069	46,656	.50	44–52
0699.1	Leather harness valued more than $70 per set, single harness valued more than $40 and saddles	312	281	.90	(1)
3520.0	Wool [3]—woolen type (clothing wool) finer than 44's, but not finer than 56's, in the grease	1,304	875	.67	9
3550.1	Wool noils, carbonized	1,983	1,006	.51	8
690.31	Table, household, kitchen, and hospital utensils, and hollow or flatware plated with silver on nickel-silver or copper	147	135	.92	17–43
951.42	Books of bona fide foreign authorship	742	416	.56	30–44
	Total	97,557	49,369	0.51	.....

[Group 2—Commodities valued from $1 to $1.99 per pound]

	EXPORTS				
0010	Cattle for breeding	6,408	$7,350	$1.15	(1)
0019	Live poultry	181	182	1.01	(1)
	Upper leather, except patent:				
0305	Calf and kip, other than black	101,703	116,793	1.15	av. 18
0307	Sheep and lamb	1,943	3,586	1.85	av. 21
0309	Goat and kid (glazed kid) other than black	16,004	191,312	1.65	av. 21
0312.1	Patent upper leather, cattle	28,965	39,347	1.36	10

See footnotes at end of table.

Digitized by Google

TABLE 8.—*United States Trade with Union of South Africa, 1939*—Continued

[Group 2—Commodities valued from $1 to $.199 per pound]

Class No.	Commodity	Shipping weight (pounds)	Value	Value per pound	Density
	EXPORTS (continued)				
0319	Patent upper leather, other (except whole calf, whole kip, goat, and kid)	4,834	$5,490	$1.14	10
0321	Lining leather, sheep and lamb	1,187	1,250	1.05	31
0323	Lining leather, other	706	913	1.29	31
0327	Boot and shoe cut stock, soles, outer	18	20	1.11	18–30
0336	Glove and garment leather, sheep and lamb	956	1,060	1.11	19
0645	Men's boots and shoes (leather)	14,258	23,019	1.61	14
0672	Leather gloves and mittens	5,170	8,108	1.57	12–28
0680	Leather belting, new	22,023	28,250	1.28	37
0688	Women's and children's handbags, pocketbooks, and purses, leather	29,130	30,661	1.05	5–9
	Card cases, change purses, wallets, and similar articles:				
0692	Leather	2,842	4,588	1.61	9
0693	Other materials	2,189	3,653	1.67	9
0698.9	Leather wearing apparel	1,019	1,584	1.55	av. 8
0929	Feathers, dressed and manufactures of	262	283	1.08	6–29
2039	Rubber gloves and mittens	7,002	8,690	1.24	12
2047	Bathing caps	4,963	7,800	1.57	8
2058	Hard rubber combs	4,041	6,342	1.57	24
2271	Citrus oils	2,659	4,334	1.63	21–42
2279	"Other" oils	7,717	10,148	1.32	21–42
2280	Blended, compounded, or mixed perfume flavor oils	17,650	22,775	1.29	24
2620	Cigars and cheroots	12,960	19,182	1.48	av. 23
3051.1	Cotton printcloth, bleached	819	1,068	1.30	42
3055.1	Cotton napped fabrics—flannels, bleached, or colored	97	119	1.23	15
3061	Other cotton colored yarn fabrics [2]	197	223	1.13	25–45
3074	Other fine goods and combed cotton fabrics [2]	2,229	2,519	1.13	10–18
3094	Cotton hosiery, children's	1,922	3,014	1.57	av. 13
3095	Cotton hosiery, men's	87,770	119,141	1.36	av. 15
3096	Cotton knit underwear, men's and boys'	13,042	17,326	1.33	av. 12
3097	Cotton knit, women's and children's	13,651	19,029	1.39	av. 11
3098	Cotton knit underwear, women's and children's	4,022	4,622	1.15	av. 7
3099.1	Men's and boys' sweaters, jersey pull-overs and sweat shirts (cotton)	7,122	8,722	1.22	av. 7
3099.5	Women's and children's sweaters, shawls, and mufflers (cotton)	5,281	6,329	1.20	av. 7
3099.9	Other cotton knit underwear [2]	14,539	20,033	1.38	7–22
	Other cotton wearing apparel:				
3115	Men's underwear	7,093	8,155	1.15	av. 7
3116.1	Men's athletic underwear, not knit	2,954	5,249	1.78	13
3117.2	Men's and boys' shirts, not knit, except work shirts	138,007	180,117	1.31	10
3122	Women's dresses and ensembles	156,051	212,243	1.36	av. 11
3127	Children's outerwear, not knit	21,587	23,943	1.11	6–22
3129	Other women's and children's apparel of woven fabric [2]	64,793	78,724	1.22	6–22
3173	Cotton quilts, comforts, and quilted bedspreads	52	52	1.00	av. 13
3175	Cotton bedspreads, candlewick, chenille, and tufted	4,739	6,957	1.47	av. 14
3178	Cotton sheets and pillowcases	1,080	1,093	1.01	20–32
3643	Mohair cloth	1,101	1,204	1.09	12
3665	Wool felts	8,014	12,632	1.58	av. 18
3679	Wool knit wearing apparel (except bathing suits)	9,080	9,625	1.06	av. 10
3681	Women's and children's wool clothing	38,597	67,566	1.75	16
3689	"Other" manufactures of wool or mohair	10,393	11,017	1.06	(1)
3720	Broad silks	1,454	2,000	1.38	22
3729	Silk and velvet ribbons	344	590	1.72	12
3741	Silk underwear	10,272	16,441	1.60	8–16
3757	Men's silk socks	12,034	19,814	1.65	av. 12
3830	Rayon waste	21	28	1.33	11–33
	Piece goods, wholly or chiefly rayon, or other synthetic fiber:				
3845	Pile (velvets, etc.)	7,317	11,641	1.59	21
3849.1	Woven fabric	19,820	21,730	1.10	31
	Rayon and other synthetic textiles:				
3854	Hosiery, women's and children's	2,761	3,996	1.45	av. 13
3856	Hosiery, men's socks	83,322	97,783	1.17	av. 13
3857.1	Knit underwear	27,006	41,925	1.55	av. 10
3858.1	Ribbons	739	1,062	1.44	12
3859	"Other" manufactures	27,560	32,411	1.18	(1)
3944	Hats of straw, palm leaf, etc., sewed, other than harvest hats	32,242	36,212	1.12	3–10
3945	Hats of straw, palm leaf, etc., woven, other than harvest hats	17,505	24,603	1.41	3–10
3953	Wool-felt hats	9,735	15,116	1.55	3–10
3958	Hats, caps and berets, of woven fabric	6,399	9,300	1.45	10–15
3963	Artificial or ornamental flowers, fruits, vegetables, etc	7,146	7,575	1.06	3–6
3988	Elastic webbing, not over 1¼" wide	1,327	2,065	1.56	av. 22
3994	Garters, suspenders, armbands, braces	25,727	26,910	1.05	av. 17
5217	Laminated glass and manufactures	182	222	1.22	64–80
5458.3	Asbestos clutch facing, woven	204	214	1.05	30–50
6146	Gasoline stoves and room and water heaters	3,937	5,736	1.46	9
6167	Drills, reamers, counter-sinks, metal cutting	7,563	13,115	1.73	30–65
6465	Hinges and butts of brass or bronze	307	574	1.87	48–90
6630	Nickel chrome electric resistance wire	309	506	1.64	50
7036	Electrical indicating instruments	10,450	18,705	1.79	5–17
7038	Other electrical testing apparatus and parts	38,946	39,335	1.01	(1)
7063	Electric lamps for automobiles, flashlights, and Christmas trees	21,202	27,563	1.30	5–12
7075.9	Therapeutic apparatus and parts, other than X-ray	9,263	10,282	1.11	(1)
7077	Radio receivers	974,655	1,218,319	1.25	7–29
7079	Radio receiving set components	81,097	120,024	1.48	11–36
7081	Other receiving set accessories (except tubes and speakers)	19,485	24,161	1.24	(1)
7082	Telegraph apparatus and parts	66	91	1.38	24
7083	Telephones	1,568	2,947	1.88	50
7087	Other telephone equipment and parts	8,314	8,563	1.03	.....
7159	Internal combustion engine accessories and parts	19,294	19,487	1.01	av. 45
7457	Portable pneumatic tools	53,201	56,393	1.06	24–140
7485	"Other" metal-working machine tools and parts	2,764	3,648	1.32	15–69
7553	Sewing machine parts	9,768	17,191	1.76	39
7759	Card-punching, sorting, and tabulating machines	600	930	1.55	16
7761	Parts for accounting and calculating machines	12,846	17,985	1.40	23
7764	Cash registers	90,983	113,729	1.25	17–31
7775	Typewriter parts	6,762	7,844	1.16	22
7779	"Other" office appliances and parts	26,743	30,220	1.13	(1)
8119	Vitamins and vitasterols	1,067	1,735	1.63	(1)
8127	Tablets, pills, capsules, powders, ointments, and similar manufactures	66,206	67,994	1.03	25
8155	Asthma, catarrh, and hay-fever preparations, including inhalants	15,480	16,300	1.05	30–45
8167	Headache, neuralgia, and pain remedies	13,768	15,751	1.14	30–45
8755	Rouges	11,756	14,236	1.21	30
9000	Motion-picture cameras, standard gage (35 mm.)	91	124	1.36	36
9001	Motion-picture cameras, substandard gage (less than 35 mm.)	17,843	27,307	1.53	36
9005	"Other" cameras	10,385	13,251	1.28	av. 40
9008.1	Motion-picture projectors, sub-standard gage, silent	41,929	42,158	1.01	20–28
9008.2	Motion-picture projectors, sub-standard gage, sound	21,606	41,422	1.92	14

See footnotes at end of table.

Digitized by Google

TABLE 8.—*United States Trade with Union of South Africa, 1939*—Continued

[Group 2—Commodities valued from $1 to $1.99 per pound]

Class No.	Commodity	Shipping weight (pounds)	Value	Value per pound	Density
	EXPORTS (continued)				
9010	Motion-picture sound equipment, recording	2,157	$3,193	$1.48	(1)
9143	Spectacles, eyeglasses, goggles, lenses [2] and frames	46,326	64,116	1.38	11–41
9157	Surgical and medical instruments	20,373	26,791	1.32	21
9160	Surveying and engineering instruments	952	1,245	1.31	18–33
9190	"Other" scientific and laboratory professional instruments and apparatus	79,087	85,098	1.08	3–87
9293	String musical instruments	17,581	17,676	1.01	2–6
9315	Metallic pen points	1,327	2,560	1.93	39–45
9395	Typewriter ribbons	10,373	15,655	1.51	47
9433	Golf balls	2,853	4,709	1.65	18–33
9436	Golf clubs	20,640	29,475	1.43	(1)
9579	"Other" clocks and parts	1,280	1,691	1.32	17–48
9629	"Other" articles of jewelry of materials, other than metal	2,946	4,950	1.68	(1)
9712	Buttons, button parts, etc., of materials other than plastics	11,134	17,605	1.58	6–38
9713	Button parts, backs, blanks, or molds	974	1,219	1.25	6–38
9791	Incandescent mantels	498	562	1.13	9
9824	Toilet brushes, other than tooth	7,622	14,030	1.83	5–16
9825	Paint brushes, except industrial	6,330	6,982	1.10	25
9827	Combs	709	915	1.29	24
9831	Umbrellas and parasols	5,107	6,449	1.26	av. 26
	Total	3,142,702	4,041,627	1.29	
	IMPORTS				
0922.1	Ostrich feathers, crude	45,601	87,209	1.91	1
0982.7	Natural history specimens for scientific purposes	1,153	1,333	1.16	(1)
2945.1	Cut flowers, dried, prepared or preserved	580	725	1.25	8–20
3113.9	"Other" wearing apparel, cotton, not knot or crocheted	8	10	1.25	7–22
709.99	Electrical goods and parts [2] including signaling, welding ignition apparatus, instruments (other than laboratory) and devices	(est.) 286	286	1.00	(1)
9501.0	Books, maps, music, engravings, photographs, etchings, lithographic prints and charts	11,539	17,308	1.50	30–47
9503.2	Books, imported for educational and religious purposes, not for sale	1,026	1,539	1.50	30–47
9650.0	Works of art, collections in art, science, agriculture, or manufacture, antiquities	420	475	1.13	(1)
	Total	60,613	108,885	1.80	

[Group 3—Commodities valued from $2 to $2.99 per pound]

	EXPORTS				
	Upper leather, except patent:				
0304	Calf and kip, black	15,982	$39,273	$2.46	av. 18
0308	Goat and kid (glazed kid), black	36,231	90,286	2.49	av. 21
0647	Women's and misses' boots and shoes	129,409	321,162	2.48	11
0759	"Other" fur manufactures	85	217	2.55	4–6
2268	Peppermint oil	3,321	6,972	2.10	21–42
3090	Cotton handkerchiefs	37	81	2.19	av. 15
3091.2	Cotton dress gloves and all other except work gloves, mits, and gauntlets of fabric	340	698	2.05	av. 11
3093	Cotton hosiery, women's	7,329	14,714	2.01	av. 18
3113	Men's and boys' jackets and windbreakers of corduroy, moleskin, leatheret, and sheep-lined	683	1,462	2.14	av. 25
3124	Women's and children's cotton underwear and nightwear, not knit	3,475	8,203	2.36	13
3185	Cotton laces, embroideries, and lace window curtains	96	213	2.22	8
3642	Wool cloth and dress goods	432	936	2.17	16
3675	Wool knit bathing suits	4,694	11,689	2.49	10
3680	Men's and boys' overcoats, suits, and pants (wool)	17,657	36,122	2.05	av. 17
3742	Silk dresses, skirts, and blouses	93,278	264,721	2.84	10
	Rayon and other synthetic textiles:				
3852	Dresses, skirts, blouses, and other outerwear, not knit or crocheted	839,591	1,739,913	2.07	10
3853.1	Knit or crocheted dresses and ensembles	120,104	281,990	2.35	10
3853.2	Other knit outerwear	1,483	3,597	2.43	8–12
3857.2	Woven underwear	26,779	56,929	2.13	av. 12
3857.7	Sleeping and lounging garments	5,796	14,915	2.57	8–14
3921	Corsets, brassieres, and girdles	165,592	486,180	2.94	av. 12
6112	Safety razors	1,240	3,001	2.42	38
6118	Machine knives	296	762	2.57	174
6230	Tungsten metal, wire, shapes, and alloys	1,510	4,067	2.69	49
6635	Quicksilver (mercury)	22	60	2.73	172–800
7037	Electrical recording instruments	1,727	4,525	2.62	25
7076	Radio transmitters, tubes, and parts	12,476	26,573	2.13	9–26
7078	Radio receiving tubes	35,623	71,603	2.01	9
7752	Listing-adding-bookkeeping machines	39,440	96,629	2.45	16–24
7753	Typing-bookkeeping-billing machines	17,457	39,803	2.28	15–20
7756	Listing-adding machines	40,763	86,826	2.13	16–34
7757	Calculating machines	11,389	33,028	2.90	16–23
8122	Vaccines–for human use	1,156	3,320	2.87	(1)
8123	Glandular products, organotherapeutics, enzymes, ferments, and culture media	11,536	25,333	2.20	(1)
8157	Malaria, chill, and fever remedies	15	32	2.13	30–45
8756	Lipsticks	18,922	37,769	2.00	av. 30
9158	Surgical appliances, artificial limbs, etc	20,976	46,043	2.20	4
9470	Revolvers and pistols	3,511	7,801	2.22	av. 42
9580	Watches, without jewels	51,683	148,460	2.87	av. 46
9610	Paintings, etchings, engravings, and statuary	514	1,092	2.12	(1)
9626	"Other" articles of jewelry of metals other than gold or platinum	6,552	18,149	2.77	(1)
9627	Men's jewelry other than metal	956	2,572	2.69	(1)
9628	Women's jewelry other than metal	4,536	13,291	2.93	(1)
9711	Buttons, button parts, etc., of plastics	4,327	9,779	2.26	6–38
9822	Toothbrushes	3,875	9,163	2.36	14
	Total	1,762,896	$4,068,964	2.31	
	IMPORTS				
0299.9	Hides and skins [3]	7,257	18,133	2.50	(1)
0711.4	Goat and kidskin furs, undressed	2,308	6,339	2.75	av. 17
0951.0	Ivory tusks	6,489	15,150	2.33	70
	Total	16,054	$39,622	2.47	

See footnotes at end of table.

Digitized by Google

TABLE 8.—*United States Trade with Union of South Africa, 1939*—Continued

[Group 4—Commodities valued from $3 to $3.99 per pound]

Class No.	Commodity	Shipping weight (pounds)	Value	Value per pound	Density
	EXPORTS				
0900	Horses for breeding	1,558	$5,130	$3.29	(1)
3719	Sewing, embroidery, and crochet silk	18	60	3.33	16–19
3755	Women's full-fashioned silk hosiery	135,991	496,408	3.65	av. 11
3759	"Other" silk wearing apparel	4,058	13,461	3.32	8–16
3928	Neckties, cravats, mufflers, and scarfs	8,582	27,254	3.18	av. 22
3952	Women's and girls' fur-felt hats	1,172	4,019	3.43	3–6
6168	Hand-operated screw plates, bolt dies, taps and tap wrenches	8,214	27,181	3.31	53–120
7075.1	X-ray tubes	1,803	6,979	3.87	2
7099.1	Electric razors	8,315	26,441	3.18	16
7947	Aircraft engine parts and accessories	24,371	75,306	3.09	4–40
8121	Serums and antitoxins for human use	396	1,445	3.65	(1)
9112	Stereopticions, magic lanterns, and other projection apparatus	16,268	56,580	3.48	(1)
9123.5	Exposed motion-picture films, positives, news reels (less than 4,000 feet)	382	1,190	3.12	av. 40
9142	Ophthalmic lenses	1,324	4,271	3.23	9–29
9149	Other optical goods	6,726	21,657	3.22	(1)
9150	Dental instruments	9	34	3.78	13–20
9302	Mechanical pencils, other than plastic	1,159	3,681	3.18	17–30
9635	Jewelry findings, parts and materials	40	145	3.62	(1)
	Total	220,386	771,242	3.50	
	IMPORTS				
0729.5	"Other" undressed furs	3	9	3.00	(1)

[Group 5—Commodities valued from $4 to $4.99 per pound]

Class No.	Commodity	Shipping weight (pounds)	Value	Value per pound	Density
	EXPORTS				
3799	"Other" silk manufactures	1,433	$6,331	$4.42	av. 8
3957	Hats, caps, and berets, knit	15	68	4.53	10–15
6956	Sterling and other solid silverware, other than knives, forks, and steak sets	10	49	4.90	17–43
7482	Milling cutters, machine-operated threading dies and taps, and similar machine-operated metal-cutting tools	2,191	10,866	4.96	15–69
9007	Motion-picture projectors, standard gage (33 mm.)	4,443	21,229	4.78	av. 11
9114	Motion-picture film negatives, sensitized, not exposed, less than 1 inch wide	12,268	49,665	4.05	av. 40
9123.1	Motion-picture films, positive, exposed, features, (4,000 feet or over)	26,558	106,231	4.00	av. 40
9828	Pipes (tobacco)	5,397	22,334	4.14	13
	Total	52,315	$216,773	4.14	
	IMPORTS				
690.25	Silver manufactures [3]	3	13	4.33	(1)

[Group 6—Commodities valued from $5 to $9.99 per pound]

Class No.	Commodity	Shipping weight (pounds)	Value	Value per pound	Density
	EXPORTS				
3754	Silk hosiery, women's and children's, seamless	1,115	$10,980	$9.85	av. 11
3951	Men's and boys' fur-felt hats	1,506	7,568	5.03	3–10
6197	Precision scales, balances, and weights for laboratory use	248	1,270	5.12	av. 18
7948	Aircraft instruments and parts	227	1,379	6.08	4–12
9006	Camera parts (except lenses)	950	5,680	5.98	(1)
9113	Motion-picture films, sensitized, not exposed, positives, less than 1 inch or more wide	237	1,672	7.05	av. 40
9121.9	Motion-picture films, exposed, negatives, other than news reels, (less than 4,000 feet)	273	2,299	8.42	av. 40
9123.9	Motion-picture films, exposed, positives, other than news reels, (less than 4,000 feet)	10,951	57,360	5.24	av. 40
9301	Mechanical pencils, plastic	1,695	9,136	5.39	17–30
9310	Fountain and stylographic pens, other than plastic	1,810	14,237	7.87	8–28
9312	Parts of fountain and stylographic pens	99	755	7.63	8–42
9621	Men's jewelry of metals other than solid gold or platinum	3,177	17,252	5.43	(1)
9623	Women's jewelry of metals other than solid gold or platinum	8,339	60,290	7.23	(1)
	Total	30,872	$191,131	6.19	
	IMPORTS				
0711.2	Persian-lamb furs, undressed	295,530	2,533,465	8.58	av. 17
0734.32	Persian-lamb furs, dressed, dyed	176	1,620	9.20	av. 17
3740.4	Silk wearing apparel, not knit or crocheted, not embroidered or of lace	5	37	7.40	av. 10
9025.8	Motion-picture film positives, prints, or duplicates, shorts (less than 4,000 feet) other than news reels	5	27	5.40	av. 40
	Total	295,530	$2,535,149	8.58	

[Group 7—Commodities valued from $10 to $24.99 per pound]

Class No.	Commodity	Shipping weight (pounds)	Value	Value per pound	Density
	EXPORTS				
0713	Fox furs, silver or black, undressed	363	$6,511	$17.94	av. 17
0714	Fox furs, red, undressed	9	100	11.11	av. 17
6189	Sewing-machine needles	758	9,853	13.00	37
6190	Other needles	9	196	21.78	37
6997	Gold manufactures [2]	166	2,858	17.22	(1)
9115	Motion-picture films, sensitized, not exposed, positives, 1 inch or more in width	2	43	21.50	av. 40
9147	Lenses, not fitted to instruments	301	5,121	17.01	45
9309	Fountain and stylographic pens—plastic	4,033	64,871	16.09	15
9589	Watch parts	516	6,041	11.71	25–66
	Total	6,157	$95,594	15.53	
	IMPORTS				
6821.5	Platinum sponge and scrap	8	180	22.50	(1)
685.19	All other metal articles, valued above $5 per dozen pieces to be worn on apparel or carried on or about or attached to the person	2	39	19.50	(1)
9022.3	Motion-picture film negatives, exposed and developed, shorts (less than 4,000 feet) other than news reels	7	90	12.86	av. 40
9620.1	Original paintings, pastels, drawings, and sketches	34	447	13.15	(1)
	Total	51	$756	14.82	

See footnotes at end of table.

Digitized by Google

TABLE 8.—*United States Trade with Union of South Africa, 1939*—Continued

[Group 8—Commodities valued $25 and over per pound]

Class No.	Commodity	Shipping weight (pounds)	Value	Value per pound	Density
	EXPORTS				
0749	"Other" dressed or dyed furs	(4)	$8	$38.10	av. 17
0753	Fur-wearing apparel	60	1,695	28.25	4–6
6922	Platinum ingots, sheets, wire, alloys, and scrap	2	85	42.50	(1)
6929	Platinum manufactures, except jewelry	6	289	48.17	(1)
9154	Dental gold and precious metal alloys for dental purposes	175	8,309	47.48	(1)
9581	Watches, with jewels	1,058	28,103	26.56	av. 46
9620	Jewelry of solid gold or platinum	2	186	93.00	(1)
	Total	1,303	$38,675	29.68	.....
	IMPORTS				
0713.0	Marten furs, undressed	64	1,650	25.78	av. 17
5466.0	Diamond dust	3	1,751	583.67	(1)
5950.0	Diamonds, rough or uncut, suitable for cutting into gem stones	566	7,656,408	13,527.22	(1)
5951.1	Diamonds, cut but unset, less than 10 stones per carat	3	82,657	27,552.33	(1)
5951.5	Diamonds, cut but unset, 10 or more stones per carat	3	104,450	34,816.67	(1)
5952.0	Diamonds, glaziers' and engravers', unset, and miners'	3,107	7,276,217	2,341.88	48
5954.0	Emeralds, rough or uncut	1	3,850	3,850.00	(1)
9503.6	Stamps, foreign postage or revenue and foreign Government stamped envelopes or post cards	72	1,823	25.32	(1)
	Total	3,819	$15,128,806	3,961.45	.....

[1] Not available.
[2] Not elsewhere specified.
[3] Not specifically provided for.
[4] Less than 1 pound.

TABLE 9.—*United States Trade with the Union of South Africa, 1939*

[Perishable commodities (category 2)]

Class	Commodity	Shipping weight (pounds)	Value	Value per pound	Density
	EXPORTS				
0010	Cattle for breeding	6,408	$7,350	$1.15	(1)
0019	Live poultry	181	182	1.01	(1)
0020	Beef and veal, fresh or frozen	572	60	.10	20.50
0027	Pork, fresh or frozen	54	11	.20	25.36
0035	Sausage, not canned	793	268	.34	32–37
0053	Lard	116,043	9,166	.08	36
0070	Fresh salmon	1,915	262	.14	38–52
0072	Oysters, fresh, in the shell, shucked, frozen, or in ice	191	27	.14	37
0074	Shrimp, fresh, frozen or in ice	3,255	416	.13	(1)
0900	Horses for breeding	1,558	5,130	3.29	(1)
0901	Other horses	8,216	150	.02	(1)
0909	Other live animals	1,263	389	.31	(1)
1207	Fresh beans	224	12	.05	19–48
1256	Yeast	155	95	.61	22
1309	Fresh cherries	2,633	488	.19	23–42
1315	Grapes	52,456	3,315	.06	24–40
1316	Pears	11,988	661	.06	35–39
2599	Nursery and greenhouse stock [2]	1,852	150	.08	16
2620	Cigars and cheroots	12,960	19,182	1.48	av. 23
	Biologics:				
8120	For animal and veterinary use	7,495	6,618	.88	(1)
8121	Serums and antitoxins for human use	396	1,445	3.65	(1)
8122	Vaccines for human use	1,156	3,320	2.87	(1)
8123	Glandular products, organotherapeutics, enzymes, ferments, and culture media	11,536	25,333	2.20	(1)
	Total	243,300	84,030	0.34	.....
	IMPORTS				
0015.0	Live chickens, ducks, geese, and guineas	180	$34	$0.19	(1)
0895.4	Wild animals and birds, for exhibition, not for sale or profit	11,007	1,475	.13	(1)
0906.9	Live animals [3]	688	249	.36	(1)
1318.5	Grapes (other than hothouse)	380,520	14,265	.04	40
	Total	392,395	16,023	0.04	.....

[1] Not available.
[2] Also on list of fragile commodities (table 10).
[3] Not specifically provided for.

TABLE 10.—*United States Trade with the Union of South Africa, 1939*

[Fragile commodities (category 3)]

Class No.	Commodity	Shipping weight (pounds)	Value	Value per pound	Density
	EXPORTS				
2599	Nursery and greenhouse stock	1,852	$150	$0.08	16
3963	Artificial or ornamental flowers, fruits, vegetables, etc	7,146	7,575	1.06	3–6
5212	Plate glass	56,666	5,456	.10	64–80
5215	Cylinder, crown, and sheet glass	17,661	2,054	.12	45–100
5217	Laminated glass and manufactures	182	222	1.22	64–80
5220	Rolled, cylinder, crown, and sheet glass, obscured by coloring prior to solidification, not less than ⅛ inch thick	246	64	.26	30–100
5230	Other glass	37,487	8,397	.22	(1)
5232	Pharmaceutical and proprietary ware, including prescription bottles, ampoules, and vials	716,564	39,411	.05	11–26
5234	Beverage bottles	1,021,263	19,404	.02	22–30
5235	Used glass containers of all types	24,756	1,015	.04	22–30
5236	Other glass containers	5,356,951	219,635	.04	22–30
5237	Tumblers, drinking glasses, and stemware, plain, cut, or engraved	250,660	13,285	.05	12–25
5239	Table glassware [2] plain, cut, or engraved	1,225,278	66,165	.05	12–30
5255	Glass lamp chimneys and lantern globes	35,067	4,734	.13	3–9
5261	Glass globes and shades for lighting fixtures	85,460	10,597	.12	3–9
5291	Chemical glassware	2,791	2,570	.92	6–9

See footnotes at end of table.

Digitized by Google

TABLE 10.—*United States Trade with the Union of South Africa, 1939*—Continued

[Fragile commodities (category 3)]

Class No.	Commodity	Shipping weight (pounds)	Value	Value per pound	Density
	EXPORTS (continued)				
5292	Glass electric insulators	7,583	$370	$0.05	30
5299	Other glassware	292,336	29,526	.10	(1)
5320	Pottery—table and kitchen articles and utensils	7,812	1,939	.25	12–36
6197	Precision scales, balances and weights for laboratory use	248	1,270	5.12	av. 18
7035	Watt-hour and other measuring meters	7,072	6,004	.85	37–64
7036	Electrical indicating instruments	10,450	18,705	1.79	5–17
7037	Electrical recording instruments	1,727	4,525	2.62	25
7038	Other leectrical testing apparatus and parts	38,946	39,335	1.01	(1)
7063	Electric lamps for automobiles, flashlights, and Christmas trees	21,202	27,563	1.30	5–12
7064	Other metal filament lamps	25,799	17,363	.67	5–12
7065	Other electric lamps	9,619	4,771	.50	4–12
7067	Floodlights	37,834	15,285	.40	8–15
7075.1	X-ray tubes	1,803	6,979	3.87	14–60
7075.5	Other X-ray apparatus and parts	45,552	35,804	.79	
7075.9	Other therapeutic apparatus and parts	9,263	10,282	1.11	(1)
7076	Radio transmitters, tubes and parts	12,476	26,573	2.13	9–36
7077	Radio receivers	974,655	1,218,319	1.25	7–29
7078	Receiving tubeso	35,623	71,603	2.01	9
7079	Receiving set components	81,097	120,024	1.48	11–36
7080	Loudspeakers	19,346	7,990	.41	13
7081	Other receiving-set accessories	19,485	24,161	1.24	(1)
7082	Telegraph apparatus and parts	66	91	1.38	24
7083	Telephones	1,568	2,947	1.88	50
7099.1	Electric razors	8,315	26,441	3.18	16
7752	Listing-adding-bookkeeping-machines	39,440	96,629	2.45	16–24
7753	Typing-bookkeeping-billing-machines	17,457	39,803	2.28	15–20
7756	Listing-adding machines	40,763	86,826	2.13	16–34
7757	Calculating machines	11,389	33,028	2.90	16–23
7764	Cash registers, new	90,983	113,729	1.25	17–31
7766	Cash registers, used and rebuilt	2,701	913	.34	17–31
7770	Typewriters, standard, new	242,049	200,901	.83	19
7772	Typewriters, portable, new	66,824	54,662	.82	24
7774.1	Typewriters, rebuilt	35,482	19,941	.56	20
7774.9	Typewriters, other used	13,561	8,516	.63	20
7948	Aircraft instruments and parts	227	1,379	6.08	4–12
9000	Motion-picture cameras, standard gage (33 mm.)	91	124	1.36	36
9001	Motion-picture cameras, substandard gage	17,843	27,307	1.53	36
9002.3	Aerial, studio, photo-engraving, coin-oprated, and similar cameras for professional, scientific, or commercial use	2,686	1,053	.39	17–40
9003	Box cameras (set focus)	17,666	14,467	.82	17–40
9005	"Other" cameras	10,385	13,251	1.28	av. 40
9006	Camera parts (except lenses)	950	5,680	5.98	(1)
9007	Motion-picture projectors, standard gage (33 mm.)	4,443	21,229	4.78	av. 11
9008.1	Motion-picture projectors, substandard gage, silent	41,929	42,158	1.01	20–28
9008.2	Motion-picture projectors, substandard gage, sound	21,606	41,422	1.92	14
9010	Motion-picture sound equipment, recording	2,157	3,193	1.48	(1)
9011	Motion-picture sound equipment, reproducing	69,700	65,309	.94	(1)
9112	Stereopticons, magic lanterns, and other projection apparatus	16,268	56,580	3.48	(1)
9142	Pphthalmic lenses	1,324	4,271	3.23	9–20
9143	Spectacles, eyeglasses, goggles, lenses [2] and frames	46,326	64,116	1.38	11–41
9147	Lenses, not fitted to instruments	301	5,121	17.01	45
9190	Other scientific laboratory and professional instruments and apparatus	79,087	85,098	1.08	3–87
9242	Phonograph records [3]	16,089	6,178	.38	40
9570	Electric clocks	35,362	13,661	.39	16
9571	One-day alarm clocks	135,700	111,942	.82	26–40
9572	Mantel, novelty, and wall clocks	9,431	3,331	.35	26–40
9579	Other clocks and parts	1,280	1,691	1.32	17–48
9580	Watches, without jewels	51,683	148,460	2.87	av. 46
9581	Watches, with jewels	1,058	28,103	26.56	av. 46
9589	Watch parts	514	6,041	11.71	25–66
9591	Time-recording devices and parts	10,932	8,527	.78	(1)
9610	Paintings, etchings, engravings, and statuary	514	1,092	2.12	(1)
9791	Incandescent mantels	498	562	1.13	9
9793	Gasoline pressure lamps, lanterns, and parts	6,695	3,716	.56	3–22
9794	Other lamps, except electric	20,352	8,886	.44	3–22
9832	Candles	2,973	489	.16	23–41
	Total	11,696,626	3,567,989	0.31	

[1] Not available.
[2] Not elsewhere specified.
[3] Also included in table 11 (style factor).

TABLE 11.—*United States Trade with the Union of South Africa, 1939*

[Style factor commodities (category 4)]

Class No.	Commodity	Shipping weight (pounds)	Value	Value per pound	Density
	EXPORTS				
0647	Women's and misses' boots and shoes	129,409	$321,162	$2.48	11
0688	Women's and children's handbags, pocketbooks, etc., of leather	29,130	30,661	1.05	5–9
0689	Women's and children's handbags, pocketbooks, etc., other material	502,653	258,234	.51	5–9
3122	Women's cotton dresses and ensembles	156,051	212,243	1.36	av. 11
3675	Wool knit bathing suits	4,694	11,689	2.49	10
3742	Silk dresses, skirts, and blouses	93,278	264,721	2.84	10
	Rayon and other synthetic textile:				
3852	Dresses, skirts, blouses, and other outerwear, not knot or crocheted	839,591	1,730,913	2.07	10
3853.1	Knit or crocheted dresses and ensembles	120,104	281,990	2.35	10
3853.2	Other knot underwear	1,483	3,597	2.43	8–12
3952	Women's and girls' fur-felt hats	1,172	4,019	3.43	3–6
	Motion-picture films, exposed:				
9113	Positives, less than 1 inch in width	273	2,299	8.42	av. 40
9114	Negatives, less than 1 inch in width	26,558	106,231	4.00	av. 40
9115	Positives, 1 inch or more in width	382	1,190	3.12	av. 40
9116	Negatives, 1 inch or more in width				
9242	Phonograph records	16,089	6,178	.38	40
9516	Catalogs and pamphlets	93,089	28,299	.30	30–40
9560	Calendars, printed or unprinted, and advertising novelties	57,263	13,915	.24	30–40
	Total	2,082,170	$3,343,701	1.61	

Digitized by Google

Appendix

factors are included in table 3. There were no imports, but the exports

The volume of air cargo which will move between the United States and foreign countries after the war will depend upon a number of economic factors, such as the comparative speeds, costs, reliability, convenience, and quality of service of air carriers compared with surface carriers. A substantial part of air-cargo tonnage which is likely to move will consist of commodities which previously moved by steamship, while an unknown percentage of future air-cargo shipments will consist of new traffic, especially perishables, made possible by the much faster service offered by air carriers.

In initiating this series of studies, it was believed that an analysis of prewar trade will furnish some indication of the specific commodities that may be diverted to air carriers in the postwar period. Since the year 1939 is the latest period during which United States foreign trade did not show the effects of war, it was decided to use the United States export and import statistics for that year as the basis for study.

In studying the thousands of commodities which moved between the United States and the Union of South Africa, it was agreed that at least four basic factors are of major importance in determining which should be selected as offering the best prospects for transport by air. These are as follows: (1) Value per pound, (2) perishability, (3) fragility, and (4) style factor, including obsolescence.

It is recognized that no single one of these factors is necessarily of sufficient importance to justify the higher charges which will have to be made for air carriage in comparison with surface transport. It is also evident that a commodity which appears suitable for air carriage on the basis of only one factor is not as likely to go by air as one which is suitable on the basis of two or more factors. For example, a commodity worth $5 per pound which is also perishable, fragile, or possessed of a style factor is more likely to go by air than a commodity equally valuable lacking any of these other favorable characteristics.

In addition to the four major categories covered in this study there are others which merit investigation. Among these may be mentioned economies in packing, insurance, size of shipment, density, and various capital costs. Not all of these have been investigated here because the foreign trade statistics utilized did not lend themselves to such analyses.

The experience of the Army and Navy air-transport services during the present war has demonstrated that substantial packing economies are possible for almost all commodities flown. These economies for certain commodities have reached 70 percent of the total shipping weight, while the average reduction in shipping weight has been reported as approximately 30 percent. A special study of potential packing economies is planned for the commodities included under the four categories shown in this report.

In the past many commodities have been shipped by air to meet emergency situations with little consideration given to cost of service. It is clear that almost any commodity regardless of its economic characteristics may be sent by air under conditions of extreme emergency. Perishable pharmaceuticals and machine tools and parts are classes of commodities which have previously constituted important emergency shipments. Practically all of these are already included in this study because of their high value per pound. In addition to strictly emergency shipments, there will be shipments of odd items for the filling in of inventories where sudden or unexpected increases in demand result in shortages.

Categories Described

In deciding which commodities should be included in the four categories adopted, the question of definition of terms immediately arose, especially in the case of categories 2, 3, and 4 which cover perishability, fragility, and style factor. The bases for selection are briefly described below:

1. Value Per Pound

In determining which commodities should be screened on the basis of value per pound it was necessary to decide first whether net weight or shipping weight should be used, then to decide upon the minimum value per pound, and finally, after a minimum value per pound had been chosen, into how many subclasses the commodities falling above this minimum should be divided.

Since the charges to the shipper are based on gross shipping weights, rather than net weights, it was concluded that such weights were the proper ones to use in an analysis of air-cargo potentials, and they will be used exclusively in each study of the series except the first. The first study covering trade between the United States and Brazil was begun at a time when an adequate body of data on gross shipping weights was not readily available. More recently such data have become available In the United States-Brazil study, asterisks indicate where net weights are used.

After consultation with various commodity specialists it was decided that all commodities with a value of less than $0.50 per pound should be eliminated from the first category. It was felt that few commodities below that minimum would offer prospects for air carriage in the immediate postwar period. In fact, it is believed that many commodities above $0.50, particularly between $0.50 and $1, offer slight prospects for aircarriage unless additional factors, such as perishability, fragility, or style factor are also involved.

A commodity worth $0.50 a pound has a value of $1,000 per ton. If it is assumed that the typical air-borne commodity moves 9,000 miles between the United States and the Union of South Africa and that the air-line charge is $0.15 per ton-mile, then the transportation charges on 1 ton would equal $1,350 or 135 percent of the value of the commodity.

A commodity worth $3 a pound has a value of $6,000 per ton. On the basis of the assumptions just stated, air-cargo charges would amount to $1,350 or about 22 percent of the value of the commodity.

These figures may be compared with the analogous relationships for movement of railway freight in the United States. In 1939 railway freight revenue equalled 8.43 percent of the value of all commodities carried.

The commodities valued at $0.50 per pound and over have been divided into eight groups as follows:

Group 1—$0.50-$0.99 per pound.
Group 2—$1-$1.99 per pound.
Group 3—$2-$2.99 per pound.
Group 4—$3-$3.99 per pound.
Group 5—$4-$4.99 per pound.
Group 6—$5-9.99 per pound.
Group 7—$10-$24.99 per pound.
Group 8—$25 up per pound.

It is evident not only that the commodities in the higher-value groups offer better prospects for air carriage than those in the lower groups, but also that a larger percentage of the commodities in the higher-value groups are likely to go by air. For example, if 2 percent of the commodities in group 1 appear to offer especially good prospects for air carriage it might be expected that 4 percent in group 2, 6 percent in group 3, and so on would offer similar prospects.

2. Perishability

In determining the list of commodities to be included under the second category, perishability, it was necessary first to define the term perishable. It is evident that a large number of commodities would be perishable if a long enough time period and sufficient exposure to the elements were assumed. In deciding whether or not a commodity is perishable when moving in international trade, consideration has been given only to the normal time spent in transit via usual surface methods of transportation, assuming

Digitized by Google

customary packing, handling, and stowage of the commodity. If, for example, apples packed in barrels can be shipped from New York to Rio de Janeiro in 4 weeks, while apples packed in barrels normally do not deteriorate in less than 8 weeks, then apples, for the purposes of this study, will not be considered perishable. It should be pointed out that any commodity which requires refrigerants, special temperature control, or ventilation during the period of movement is also classed as perishable.

In order to determine which of the commodities met the tests of the definition aforementioned, the cooperation of numerous commodity specialists of the Department of Commerce and other Government agencies was obtained.

3. Fragility

Fragility, or breakability, is a term which, like perishability, could characterize almost all commodities under certain conditions. For the purposes of this study a commodity is defined as fragile or breakable when special care in handling or special packing is required to avoid damage under normal conditions of shipment. No attempt has been made to classify the commodities selected in respect to differing degrees of fragility.

4. Style Factor

Under the category designated style factor are included all of those commodities which lose their economic value at an exceptionally rapid rate with the passage of time because of a decline in the demand rather than a change in the physical nature of the product. Products which are subject to obsolescense are included. Examples of such are newspapers, motion-picture films, and certain textiles, such as wearing apparel.

Density or Weight

The density or weight per cubic foot of a commodity is one factor affecting the cost of moving commodities. In any transportation vehicle where space rather than weight is the limiting factor, a commodity with a low density costs more per unit of weight to move than one with a higher density, and consequently must be charged a higher rate per ton-mile.

In this series of studies the density is shown where the information is available for all commodities included in the four categories listed above. In some instances, no specific density is shown but instead a density range is given. This indicates a variation in the method of packing. Some commodity classifications, furthermore, cover such a wide range of individual articles lumped together that it is impossible to determine either a *specific* density or a density range. An example of this type of "basket" classification is Export Class No. 0699 (Other Leather Manufactures).

Upon analysis, density appears to be of less importance than the four major criteria already discussed, and, on the basis of new designs for postwar air cargo planes, may become even less significant in the future.

Size of Shipments

The economic and technological characteristics of steamship operations make this form of transportation especially suitable for large shipments of goods weighing many tons. These characteristics are reflected in steamship freight-rate structures which in many instances are quoted in terms of 1 ton or 40 cubic feet. Since it is customary to levy a minimum bill of lading charge, which between the United States and Brazil, for example, amounts to $7.50, as shipments fall below a certain weight, the rate per ton-mile rises progressively so that in the case of shipments of 25 or 50 pounds the rate per ton-mile will be several times that of a shipment weighing 1 ton or more. On such small shipments, therefore, the differences in costs between steamship and air carrier services are reduced to a minimum and air carriers will enjoy their most favorable competitive position.

The only important alternative to the freight services offered by the steamship companies is parcel post, which limits maximum shipments to a few pounds. Frequently, parcel-post charges, when reduced to a rate per ton-mile basis, amount to $0.06 or $0.08 per ton-mile for shipments of 25 to 30 pounds.

It is impossible to determine from published foreign trade statistics what commodities are shipped in quantities weighing less than 1 ton. The figures show the total weight shipped per year for individual commodities, and, in many instances, such shipments total much less than 2,000 pounds but it cannot be determined whether those small shipments were shipped individually or consolidated with other commodities in lots weighing 1 ton or more. In recent years it has become increasingly prevalent for producers and freight forwarders to consolidate small shipments into large ones to take advantage of the lower steamship freight rates available on large shipments.

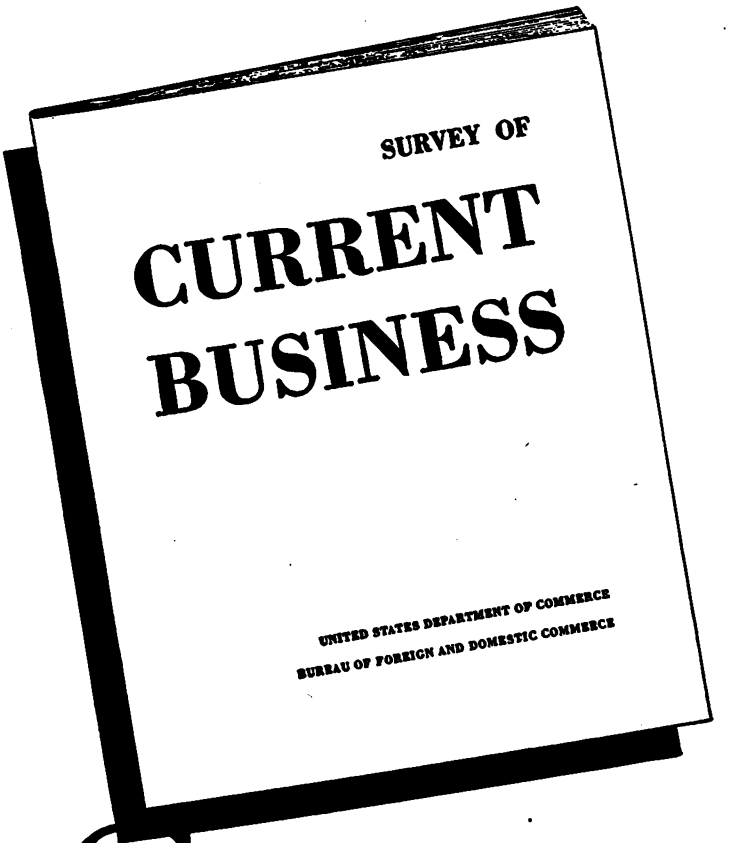
Postwar Air Cargo Rates

Recent estimates of the level of air cargo rates after the war vary from $0.05 to $0.25 per ton-mile. The differences in the estimates are primarily the result of differences in the assumptions on which the forecasts are based or on the completeness of the services under consideration. Some authorities in estimating air cargo rates have in mind airport-to-airport movement only, while others include terminal handling and pick-up and delivery services. Some writers in making postwar predictions are thinking of the period immediately following the cessation of hostilities rather than developments during the first decade. Still others base their predictions upon the assumption that the latest technological improvements will be incorporated into exclusively designed air-cargo planes and that these planes will be available shortly after the war.

In the case of air-cargo carriage between the United States and the Union of South Africa in the immediate postwar period, air cargo rates per ton-mile will depend upon whether the traffic in both directions is sufficiently large to justify specially designed air cargo planes which carry nothing but commodities. If the volume of traffic should prove to be this large, air-cargo rates from airport to airport may prove to be feasible at a level of from $0.10 to $0.15 per ton-mile depending upon the territory served. If, on the other hand, air-cargo volume proves to be so small that it must be carried in aircraft especially designed for the transportation of passengers and mail, then air-cargo rates will probably be substantially higher.

☆U. S. GOVERNMENT PRINTING OFFICE: 1946—707796—77

Digitized by Google



$2.00
per year

SURVEY OF CURRENT BUSINESS

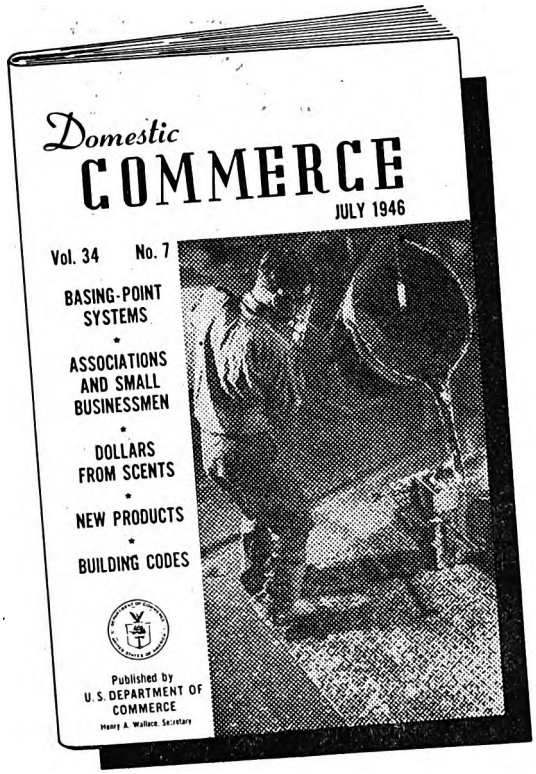
THIS AUTHORITATIVE MONTHLY PERIODICAL makes easily available to businessmen over 2,200 comprehensive facts about production, stocks, orders, prices, sales, shipments, etc., of the industries of the United States by means of text, tables, charts, and index numbers.

A sample copy will be sent, on request to the
Bureau of Foreign and Domestic Commerce,
Washington, D. C.

$2.00 per year, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Digitized by Google

Every Businessman Could Profit by Reading . . .



Pocket Size

DOMESTIC COMMERCE

96 Pages of Facts and Ideas!

- Timely news on problems that face businessmen today.
- Marketing information on numerous business activities.
- Economic surveys and trends.
- New products being designed for consumer use.
- Progress and changing conditions of industry and business.
- Monthly listing of all business service material published by the U. S. Department of Commerce.
- What's New—a regular feature on patents dedicated for public use, and new and abandoned patents.

These are typical of the material currently appearing. Articles written by specialists in the U. S. Department of Commerce as well as those of other governmental agencies.

Annual Subscription $1

Order today from the

Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

(Make check payable to Treasurer, U. S. A.)

Digitized by Google

Documents Room

Foreign + Domestic Commerce Bureau

Industrial Reference Service

U. S. DEPARTMENT OF COMMERCE, W. AVERELL HARRIMAN, *Secretary*

Office of International Trade, ARTHUR PAUL, *Director*

Part 1. TRANSPORTATION and PUBLIC UTILITIES

INDIANA UNIVERSITY
DEC 11 1946
LIBRARY

Available in Parts Covering Selected Services and Commodities
Annual Subscription $1.50. Price this report 5 cents
For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., or any of the Department's Field Offices

Volume 4—Part 1 October 1946 Number 23

D 16824

The Railways of Mexico

By Seymour T. R. Abt, Transportation and Communications Division, Special Services and Intelligence Branch

Based primarily on United States foreign service reports and other official sources

Mexico, with an area of 758,258 square miles, is the third largest country in Latin America; it is exceeded in size by Brazil and Argentina only. With its unusual shape, it is about 1,300 miles wide at the United States border but less than 150 miles wide at the Isthmus of Tehuantepec. Although the easternmost point of its northern border is due south of Austin, Tex., the Yucatan peninsula is on a line with Birmingham, Ala.

Mexico's outstanding topographical feature is the central plateau which extends lengthwise down the country in a northwest-southeasterly direction for a distance of about 1,500 miles. Although the average altitude of this tableland is about 6,000 feet, the peak of Orizaba near Mexico City is 18,700 feet high, the second highest in North America. Level, humid regions extend along both coasts and the southern border, whereas extensive, semi-arid, highland plains cover a considerable section in the north.

Lying in both the temperate and torrid zones and having varying altitudes in different areas, the climate is widely diversified. In the lowlands the mean temperature varies from 80 to 90°F.; on the temperate plateau at 6,000 feet above sea level it ranges from 70 to 80°; at more than 8,000 feet it is about 60°.

Economy

Mexico is one of the richest mineral countries in the world, and oil and metals comprise the bulk of its export trade. In recent years Mexico has been a leading producer of silver, antimony, molybdenum, lead, mercury, zinc, gold, petroleum, and graphite, and its earth yields other minerals as well.



Courtesy, Ministry of Communications and Public Works

Sonora-Lower California Railway—Cut being widened to make room for construction of defenses against sand on Km. 170, October 1945

Agriculture, however, is Mexico's basic occupation. Approximately two-thirds of the population is rural. The variations of climate and soil permit a diversification of crops from the henequen of Yucatan to the wheat of the highland plateau. Cereals, cotton, alfalfa, sugarcane, cacao, coffee, winter vegetables, citrus and other fruits, tobacco, and vanilla are all grown in Mexico. The Government's policy of giving the land to rural workers, extending them farm credits, promoting irrigation, and educating the backward population, has greatly enhanced the importance of agriculture politically, socially, and economically.

Manufacturing in Mexico has concentrated mainly on the production of consumers' goods that can be turned out by electric-powered machinery. There is, however, a steel mill in Monterrey which has a capacity for rolling up to 30,000 metric tons of rail per year. Normally, it rolls only about 15,000 to 18,000 metric tons of rail annually, as well as other types of steel products, including tie plates, rail plates, bolts, clips, spikes, and rail braces. Another mill, located in the Federal District, produces some track materials, principally a complete line of bolts for track work. These mills, however, do not satisfy the railway de-

Digitized by Google

mands for rails and accessories, and the United States will in all probability continue to be the principal supplier of these commodities.

Mexican Railways

Mexican rail development on a national scale began during the regime of President Diaz (1876-1910) and is still going on today.

The main trunk lines are laid through the most populous areas and converge on Mexico City. There is direct contact between the capital and (1) the United States at seven points between Nogales on the west and Matamoros on the east, (2) Guatemala at Suchiate, (3) several ports on both coasts, and (4) the most productive industrial, commercial, mining, and agricultural centers in the country.

The railway system, however, is as yet not complete, and the 1946 budget of the Ministry of Communications and Public Works allows 39,041,914 pesos for railroad construction. Projects are now under way which will close four major gaps:

1. *The Sureste Line* between the National Railways of Mexico and the United Railways of Yucatan. For some years now there has been service between Coatzacoalcos (Puerto Mexico) and Minatitlan on the Isthmus of Tehuantepec and in the Yucatan peninsula as far as Campeche. In order to connect Puerto Mexico with Campeche, a distance of 737 kilometers, work is going forward on a new line from Puerto Mexico and from the old Campeche terminal. By the end of 1945 the line was entirely laid out, and about 475 kilometers were in operation. Earth work was 85 to 100 percent completed on all but 5 kilometers, as well as on a 9-kilometer branch from Campeche to Lerma. Construction was in progress on rail laying, drainage ditches, culverts, bridges, telegraph lines, supply and access roads, warehouses, section houses, water intakes, yards, wells, supply sheds, and first-aid stations for the working crews.

Much of the territory covered is swampland, the region being the rainiest in Mexico. Many multiple steel bridges are needed.

2. *The Sonora-Baja California Railway* between northern Lower California and the Southern Pacific Railroad Company of Mexico. When completed, this line will be 523 kilometers long between Pascualitos on the Inter-California Railway and Benjamin Hill on the Southern Pacific. (It was originally planned to run the line to Santa Ana, just north of Benjamin Hill.) The road includes the former Inter-California Railway of the South, 69 kilometers in operation between Pascualitos and Fuentes Brotantes. Service is already offered between Pascualitos and Puerto Penasco. Work is going forward on clearing, earth work, rail laying, culverts, bridges, a station at Benjamin Hill, section houses, an access road and wells. The major difficulty is in obtaining rails. The Government is reluctant to use relay rails on the project.

3. *The Kansas City, Mexico and Orient Railway* connection between Sanchez and San Pedro, 249 kilometers. This gap has prevented the realization of the railroad's original plan, which was to connect Kansas City with the Mexican port of Topolobampo through the border point of Ojinaga. The line has never been completed largely because of its location in a difficult mountainous region. The layout work is now done. Work is progressing on clearing, earth work, rail laying, tunnels, culverts, and access roads. This line is sometimes referred to as the Chihuahua-Pacific.

4. *The Mexico City-Acapulco Line,* which involves construction of a railway from Cocula to Acapulco, 300 kilometers. Originally it was planned to connect the Pacific port with the capital through Zihuatanejo and Uruapan. This line was completed from Uruapan to Apatzingan, 126 kilometers, in 1942, and that portion was put into operation. The remainder of the project was apparently abandoned shortly thereafter in favor of the more direct line to Acapulco. The National Railways already operate to Balsas, beyond Cocula. To date the work is in a preliminary stage, only surveys having been reported.



Courtesy, Ministry of Communications and Public Works

Southeastern Railway—Bridge over the Camoapa Arroyo, May 1945

Ownership

The early construction and development of railways in Mexico depended largely on British and United States capital. The Diaz Government, pursuing a policy of granting concessions and subsidies liberally, saw the railway system grow from about 670 kilometers in 1876 to almost 25,000 kilometers in 1910. During the last years of this Administration, however, the Government began to control some of the lines directly, largely by acquiring ownership of a majority of the shares in the newly formed National Railways of Mexico, Incorporated.

In 1937 the Government expropriated the properties of the National Railways. Since that time, more lines have been taken over by the National system and newly constructed ones have been added. In addition, the Government has acquired other railroads which it operates apart from the National Railways. Private ownership is gradually disappearing from the Mexican railway scene.

The most recent developments have been the Government purchase, in 1944, of the Interoceanic Railway and that of the Mexican Railway in June 1946. One departure from the trend toward nationalization has been the sale by the Government, in January 1946, of the Mexico Northwestern Railway to a syndicate of Mexican and United States investors.

United States Railway Mission

The Railways of Mexico are generally unable to offer the service required by the country's economy. Before the war, equipment and roadbeds had fallen into a state of disrepair in many cases, and after Pearl Harbor the railways' difficulties became more serious than ever. United States manufacturers have long been the principal

Digitized by Google

source of supply of railway equipment of all kinds, so that at a time when traffic increased greatly, largely because of Mexico's contribution to the war effort, it appeared that the facilities for handling the increase would not be available.

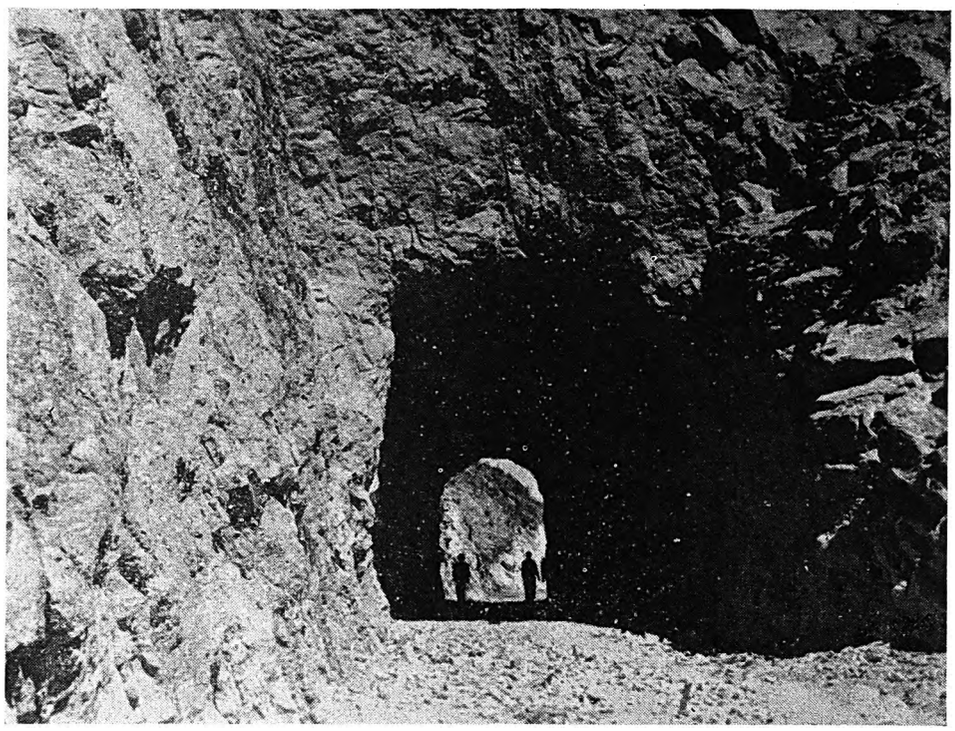
In November 1942 the Governments of the United States and Mexico entered into an agreement that provided for joint action by the United States Government and the National Railways of Mexico, designed to provide continuous rail service from Central America to the United States and to assure efficient transportation of strategic war materials to the United States. The Railway Mission, made up of United States technicians, was formed and immediately went to work. Its primary concern was the rehabilitation of four National Railway lines: (1) Laredo to Mexico City via Monterrey, Saltillo, and San Luis Potosi; (2) Torreon-Monterrey via Paradon; (3) Cordoba-Suchiate via Jesus Carranza and Ixtepec; and (4) Chihuahua-Torreon.

The joint efforts of the United States Mission and the National Railways' management have yielded the following results: Thousands of defective ties have been replaced; new heavy rails have replaced old light ones; new ballast has been laid; bridges have been rebuilt or strengthened; sidings have been installed; terminals and repair shops have been enlarged and modernized; and a reclamation plant has been set up at San Luis Potosi to reuse discarded items. Purchases of materials and equipment have been expedited wherever possible. And recently a school was opened to train National Railway employees.

Current Railway Problems

In spite of the efforts of both the Mexican authorities and the United States Mission, however, conditions on the railway system as a whole are far from good. Maintenance expenditures have not increased in proportion to the practically doubled ton-mileage, largely because of the difficulty of obtaining new materials, and the number of railway accidents has mounted. The most serious problem is the acute shortage of locomotives and freight cars in Mexico. The Ministry of Communications and Public Works, which operates the Government-owned railroads, estimated that about one-half of the National Railways' locomotives were in need of repair at the end of August 1945. The movement of seasonal crops, petroleum, lumber, and other freight necessary to the Mexican economy is often delayed.

The railway authorities are doing what they can to alleviate the situation. In August 1945 demurrage charges on the National Railways were more than tripled. The interchange of cars between companies has been encouraged. The Association of American Railroads, beset by the problems of the car shortage in the United States, has been implored time and again to make more United States rolling stock available to Mexico.



Courtesy, Ministry of Communications and Public Works

Kansas City, Mexico & Orient Railway—Tunnel No. 4, April 1944

TABLE 1.—*Federal Concession Railways of Mexico—Route Length in Operation (Kilometers)*

[Main and Branch Lines]

Railway	Ownership	1.435 M. 4′8½″	0.914 M. 3′	0.609 M. 2′	3-Rail (1.435 M. & 0.914 M.)	0.762 M. 2′6″
Ferrocarriles Nacionales de Mexico	Govt.	11,314	2,016	3	65	
The Mexican Railway Company, Limited	Govt.	525	90	32		54
Southern Pacific Railroad Company of Mexico	U. S.	2,105				
F. C. Unidas de Yucatan, S. A.	State of Yucatan	96	748		6	
F. C. Noroeste de Mexico	Private Mex.-U.S. Syn.	766				
Coahuila and Zacatecas Railway	British		166			
Nacozari Railroad Company	U. S.	123				
F. C. Kansas City, Mexico y Oriente, S. A.	Govt.	516				
Mexican Northern Railway Company	U. S.	125				
F. C. Sonora-Baja California	Govt.	242				
F. C. Sureste-Div. Campeche	Govt.	335				
F. C. Sureste-Div. Puerto Mexico	Govt.	140				
Inter-California Railway	U. S.	83				
Tijuana and Tecate Railway	U. S.	71				
F. C. Rio Mayo, S. A.	Govt. (?)	63				
F. C. Minatitlan a El Carmen	Mexican	11				
Potosi and Rio Verde Railway	U. S.		58			
Western of Mexico Railway	British (?)	65				
F. C. de Chalchicomula	Private Mexican	10				
Mexican Pacific RR Co. Inc.	U. S. mainly	44				
Camargo & Western Railway	U. S. (?)	31				
F. C. Forestal de Quintana Roo	Terr. of Quintana Roo			55		
Total		16,565	3,078	90	71	54
Grand total		19,858				

Digitized by Google

The National Railways of Mexico (Ferrocarriles Nacionales de Mexico).—Address: Balderas 31, Mexico, D. F., Mexico.

This system is a result of the consolidation and absorption of several originally independent lines: Mexican Central Railway Co., Ltd., National Railroad Co. of Mexico, Mexican International Railroad Co., Hidalgo & Northeastern Railway, Vera Cruz to Isthmus Railroad Co. (first the Vera Cruz and Pacific Railroad Co.), Vera Cruz (Mexico) Railways, Limited, Tehuantepec National Railway, Pan-American Railroad Co., Coahuila Coal Railway Co., Cienega de los Caballos Railway, Sebastopol Railway, Juile-San Juan Evangelista Railway, El Oro Mining & Railway Co., Limited, and the Interoceanic Railway (consisting of the former Interoceanic Railway of Mexico, the Mexican Eastern Railway Co., Ltd., and the Mexican Southern Railway, Ltd.) The acquisition of the Mexican Railway Co., Limited, was reported as of June 4, 1946, but that company is treated as a separate entity in this study. In addition, several lines have been constructed since the 1937 expropriation. For details of original ownership see map.

Management.—Management has passed from the private owners to the *Department Autonomo de los Ferrocarriles Nacionales de Mexico* (1937) to the Workers' Railway Administration (1938) to the *Secretaria de Comunicaciones y Obras* Publicas (1941).

Debt.—On March 19, 1946, the Minister of Finance announced that an agreement had been reached for adjustment of the old National Railways debt. The agreement, made with the International Committee of Bankers on Mexico in New York, was subject to registration and approval by the United States Securities and Exchange Commission. The agreement excludes bondholders who are citizens of enemy countries. Details of the agreement are given in the following excerpt, translated from an article in El Nacional of March 20, 1946:

"The following two alternatives are offered to the bondholders:

"(1) Under Plan A, the bondholder will authorize the return of his bonds in a proportion of 1 peso for each dollar of the principal amount, and the Mexican Government agrees to pay interest on this principal amount in pesos beginning January 1, 1946, at an average rate of approximately 4.35 percent. The specific rates of interest will vary slightly in accordance with the preferences of the various issues. It is estimated that a cumulative amortization fund, at a rate of approximately 1.78 percent per annum, will be sufficient for the purpose of retiring the bonds, in modified form over a period of 29 years, on condition that the redemption of bonds under Plan A is made by means of drawings. The preference of the issues will determine the form in which the bonds are to be redeemed.

"(2) Plan B is an arrangement of a somewhat different nature. Under this plan the bondholder will forego all interest due him from January 1 and thereafter. Nevertheless, under this plan the same amount of money as in Plan A will serve as a fund for the purpose of retiring the bonds, whether by means of purchase or through redemption at prices which, starting at the rate of slightly over twenty-one dollars per one hundred dollars of present nominal value, will gradually increase and will arrive during the lapse of 29 years at a final figure equal to par: that is, one hundred dollars per every hundred dollars of present nominal value. The retirement, either through purchase or through redemption, will be made on a basis proportionate to the number of the different types of bonds outstanding, except in the case of Plan B. It is obvious that the number of bonds retired during the first few years when the redemption price is low will be greater, and will diminish in the measure that the redemption price increases. Redemption prices will vary in keeping with the preferences of the respective issues, but the various types of bonds are planned to be retired in a substantially proportional manner.

"All payments made on bonds will be on the instructions of the bondholder, whether such payments be made in dollars or pesos, at a fixed rate of exchange, equivalent to the present rate of 4.85 pesos per dollar.

"As occurred in the case of the agreement entered into in 1942, with respect to the Direct Debt of the Mexican Government, obligations representing interests due will be acquired by the Government in a proportion similar to that established in the previous arrangement, and in the following manner:

"One percent of the nominal amount of the interest due obligations following January 1, 1923, and computed up to the date in which servicing of the Debt is renewed (in this case up to the period beginning January 1, 1946). Obligations representing interests due before January 2, 1923, will be bought at the respective rates of two per thousand and one per thousand, depending on whether the obligations represent Class A or Class B interests due, on bonds issued under the plan and agreement of June 16, 1922.

"The Mexican Government requires as an indispensable condition in the acceptance of the agreement on the part of the bondholders whose bonds were deposited under the plan and agreement of 1922 that such bondholders, for the purposes of the present agreement, consent to the adjudgment of their rights with respect to the funds in the possession of the committee of 1922, should such rights be determined. With reference to the accepting bondholders, the agreement stipulates that up to 20 percent of the amount coming within the rights of the various classes of bondholders will be used in part to cover the expenditures incurred under the new agreement, the balance to be applied to the purchase of interest due obligations and the corresponding annual payments.

"Following the registration of the present agreement with the Securities and Exchange Commission, the said agreement will be placed at the disposal of holders of those bonds which have been proven to be the property of citizens of non-enemy countries, according to the decree issued by the Mexican Government in 1942. The agreement will be declared in effect as soon as 55 percent of the holders of qualified bonds have signified their acceptance of either Plan A or Plan B; or the agreement may also be declared in effect, with the approval of the Committee, on the acceptance thereof of a smaller percentage of bondholders. Signatories of this agreement are the representatives of the United States, English and Swiss sections of the Committee, there being a possibility that later, following new provisions, representatives of the French, Belgian and Dutch sections may be included.

"The agreement has been signed by the Minister of Finance with the approval of the President of the Republic in accordance with the authorization granted by the Mexican Congress during the session closing December 31, 1945.

"A copy of this agreement will be furnished the Committee, for its inspection, at its offices at 14 Wall Street, New York, and also in the Banco de Mexico, S. A., in Mexico City.

"Once the Railroad Debt Agreement is accepted by the bondholders, the indemnization now under study concerning 'El Aguila' Petroleum Co. is settled, and negotiations already begun with Belgian, French, and Dutch holders of Mexican External Debt bonds are successfully terminated, the Government of Sr. Manuel Avila Camacho will be up to date in each and every one of its international obligations.

"Obligations contracted under the 1942 agreement, accepted by more than 90 percent of the bondholders involved, arrangements concerning land claims, the petroleum indemnization, and commitments with the Export-Import Bank of Washington are all up-to-date in the matter of service payments."

Permanent way.—Maximum curvature: 1°00′ to 34°00′. On the main lines the most difficult curves are as follows: Tehuacan—Oaxaca—Taviche (12°00′-18°00′); Mexico City-Apatzin-

Digitized by Google

gan (12°05′-15°45′); San Luis Potosi-Las Palmas (10°30′-14°30′); Mexico City-Balsas (10°00′-12°00′); Cordoba-T. Blanca (12°30′). There are some curves of 12°00′ to 15°30′ on branches of the Mexico City-Vera Cruz line. Maximum gradient—4.95 percent (Tomellin-Oaxaca, not compensated). On the main lines the steepest grades are 4 percent compensated, on the Cuernavaca-Balsas line, and 3.91 percent, not compensated, on the Mexico City-Toluca line. There is a grade of 4.16 percent, not compensated, out of Las Arcos toward Atencingo. Ballast: Crushed rock, slag, dirt, cinders, and river gravel. Ties: Wood, both hard and soft. Rails: Various weights are used averaging about 70 pounds per yard on the main and branch lines, exclusive of the Interoceanic. On the Interoceanic the average weight is about 50 pounds per yard.

Structures.—Bridges: 255, plus unknown number on Interoceanic. Tunnels: 46 including 11 on Interoceanic. Shops and roundhouses.—Principal shops: Aguascalientes, Nonoalco (Federal District), Monterrey. Other shops: San Luis Potosi, Gomez Palacio, Dona Cecilia, Guadalajara, Chihuahua, Durango, Monclova, Acambaro, Tierra Blanca, Matias Romero, Puebla. Roundhouses at Aguascalientes, San Luis Potosi, Gomez Palacio, Dona Cecilia, Guadalajara, Chihuahua, Durango, Cardenas, Vanegas, Ciudad Juarez, Jimenez, Matehaula, Monterrey, Monclova, Piedras Negras, Hipolito, Nuevo Laredo, Matamoros, Buenavista, (Federal District), Nonoalco (Federal District); Acambaro, Tierra Blanca, Matias Romero, Empalme Escobedo, Coatzocoalcos, Salina Cruz, Celaya, San Lazaro (Federal District), Oriental, Jalapa, Vera Cruz, Cuautla, Morelos, Oaxaca, Puebla, Tehuacan, Tomellin.

Locomotives (1944).—Standard gage: 698 in operation, 153 in shops. Narrow gage (exclusive of Interoceanic): 77 in operation, 19 in shops. Narrow gage (Interoceanic): 56 in operation and 6 in shops. Standard gage power averaged 36,349 pounds per unit, and narrow gage (exclusive of Interoceanic) 24,525. The Interoceanic locomotives averaged about 18,081 pounds of tractive power each. Of the total, 15 standard-gage Diesels were acquired in 1944. In addition, one standard-gage and one narrow-gage locomotive were constructed in the National Railways shop. However, 14 standard-gage locomotives were retired in 1944, so that the net gain over 1943 amounted to 3 units. Fuel consumed (1942): 101,000,000 kilograms coal, 1,006,000,000 liters oil and lubricants, 45,000 liters gasoline. On Interoceanic no coal or gasoline, 136,000,000 liters oil and lubricants.

Freight cars (1944).—Standard gage: 7,569 boxcars in operation, 484 under repair, 721 stock cars in operation, 86 under repair, 621 flatcars in operation, 128 under repair, 1,984 gondolas in operation, 115 under repair, 1,662 tank cars in operation, 38 under repair, 31 miscellaneous in operation, 9 under repair. Total, 12,588 in operation, 860 under repair. Average capacity of cars in operation 39.4 metric tons, of cars under repair 38.5 metric tons. Narrow gage (exclusive of Interoceanic): 1,705 boxcars in operation, 36 under repair, 142 stock cars in operation, 1 under repair, 164 flatcars in operation, 3 under repair, 62 gondolas in operation, none under repair, 117 tank cars in operation, none under repair, 3 miscellaneous in operation, none under repair. Total 2,193 in operation, 40 under repair. Average capacity of cars in operation 26.6 metric tons, of cars under repair 26.9 metric tons. Narrow gage (Interoceanic): 127 boxcars in operation, 3 under repair, 69 flatcars in operation, 2 under repair, 76 gondolas in operation, 7 under repair, 8 water tank cars in operation, none under repair, 83 oil tank cars in operation, 2 under repair, 32 miscellaneous cars in operation, 3 under repair. Total 395 in operation, 17 under repair.

Passenger cars (1944).—Standard gage: 299 in operation, 48 under repair. Average capacity about 82 seats per car. Narrow gage (exclusive of Interoceaanic): 140 in operation, 4 under repair. Average capacity about 50 seats per car. Narrow gage (Interoceanic): 15 in operation, 4 under repair.

Work cars (1942).—Standard gage: 91 in operation, 25 under repair. Narrow gage (exclusive of Interoceanic): 8 in operation, none under repair. Narrow gage (Interoceanic): 10 in operation, none under repair.

Couplers and brakes.—ARA Standard, Sharon, Tower, Simplex, Miner. Interoceanic equipped with Westinghouse air brakes.

Traffic.—National Railways (1943): 11,673,115 metric tons carload revenue freight, 565,583 metric tons LCL revenue freight, 22,849,984 revenue passengers (approximately 2,000,000 increase reported for 1944). Average rates (1944): 2.820 centavos per ton-kilometer, 1.699 centavos per passenger-kilometer. Interoceanic Railway (1944): 1,125,000 metric tons freight, 5,659,612 passengers. Average rates (1944): 0.03796 pesos per ton-kilometer, 0.02124 pesos per passenger-kilometer.

Financial.—National Railways (1945): Operating revenues 346,602,285 pesos, other revenues 9,240,810 pesos. Operating expenses 320,451,684 pesos, other expenses 22,348,827 pesos. Nominal capitalization (1944) 1,246,660,579 pesos. Interoceanic Railway (1944): Operating revenues 20,251,970 pesos, other revenues 224,911 pesos. Operating expenses 28,031,844 pesos, other expenses 1,833,323 pesos. Capitalization not reported. Properties purchased by Government in 1944 at reported 12,000,000 pesos.

Employees (1944).—National Railways 51,071. Interoceanic Railway 5,961.

The Mexican Railway Company, Limited (Ferrocarril Mexicano, S.A.)—Address: Plaza de Buenavista 11, Mexico, D.F., Mexico.

This line is important in that it is the only standard-gage road between the capital and Vera Cruz. Furthermore, without the Mexican Railway standard-gage, through transportation from Mexico City to the south of Mexico and Central America is impossible. Negotations have been completed for sale of the properties to the Government, which plans to incorporate the lines into the National Railways system. The selling price was reported as 41,500,000 pesos plus certain other financial considerations.

Permanent way.—Maximum curvature: 19°10′ on the Huatusco branch. Maximum gradient: 4.1 percent on electrified section between Esperanza and Orizaba. Ballast: Broken stone on trunk line and probably on branches. Ties: Steel and wood. Rails: 30-85 pounds per yard, averaging 80.378 pounds per yard on trunk line and Pachuca and Puebla branches. Electrification: Esperanza to Paso del Macho, 103 kilometers, voltage 3,000 D.C.

Structures.—Bridges: 738, over-all length 3,022 meters. Tunnels: 16, from 12 to 130 meters each. Repair shops: Cordoba. Orizaba, San Marcos, Apizaco, Munoz, Pachuca, Mexico City.

Locomotives (1943).—Oil.—10 freight, 10 passenger, 5 switch, 13 mixed in operation; 5 freight, 7 passenger, 8 switch, 3 mixed under repair. Average tractive power 13,942 kilograms. Fuel consumed (1942): 69,000,000 liters oil and lubricants. Electric: 9 in operation, 3 under repair. Average tractive power: 21,999 kilograms. Fuel consumed (1942): 20,000,000 kilowatts.

Freight cars (1943).—Main line: 525 box, 54 gondolas, 89 flat, 65 oil tanks, 68 stock, 20 cabooses in operation; 56 box, 6 gondolas, 2 flat, 5 oil tanks, 1 caboose under repair. Total capacity: 37,212 metric tons. Branches: 86 box, 2 gondolas, 38 flat, 2 oil tanks, 13 stock, 1 caboose in operation; 1 box, 1 flat under repair. Total capacity: 2,371 metric tons.

Passenger cars (1943).—65 in operation, 16 under repair. Average capacity: 51 seats.

Baggage cars (1943).—16 in operation, 1 under repair.

Working equipment (1943).—80 cars. Total capacity: 170 metric tons.

Traffic (1943).—63,926 full carloads carrying 1,463,651 metric tons plus 70,016 metric tons LCL freight, 2,811,488 passengers. Average rates: 0.04 pesos per ton-kilometer, 0.02 pesos per passenger-kilometer.

Financial (1943).—Operating revenues: 20,682.290 pesos. Operating expenses: 23,020,904 pesos. Authorized

Digitized by Google

capital stock: 112,789,080 pesos. Issued capital stock: 104,774,040 pesos. Subscribed capital stock: 104,774,040 pesos. Cumulative deficit December 31, 1943: 44,274,583 pesos.

Employees (1943).—5,102.

The Southern Pacific Railroad Co. of Mexico (Ferrocarril Sud-Pacifico de Mexico).—Subsidiary of Southern Pacific Railway Co. Home Address: Guadalajara, Jalisco, Mexico. Local address: Avenida 5 de Mayo 32-210, Mexico, D.F., Mexico.

Permanent way.—Maximum curvature: 9°10′ on the spur to Guaymas. All lines and branches, with the exception of the Quila to Eldorado section, have spiral curves. Maximum gradient: 2.60 percent compensated on the line east of Nogales. Ballast: Rock. Ties: Pine, redwood, hardwoods. Rails: 61.5-90 pounds per yard, averaging 66 pounds per yard.

Structures.—On the Tepic-La Quemada section, 29 viaducts (8,000 feet) and 33 tunnels (about 5 miles) have been reported. A total of 23 bridges (24,490 feet) have been reported on the remainder of the line. Roundhouses: Naco, Nogales, Carbo, Empalme, Navojoa, San Blas, Culiacan, Mazatlan, Ruiz, Tetitlan, Guadalajara, Car repair house: Nogales. General workshops: Empalme. Machine shops: Tepic, Barrancas.

Locomotives (1944).—Passenger (oil): 14 in operation, 4 under repair. Freight (oil): 12 in operation, 5 under repair. Yard: 8 in operation, 2 under repair. Mixed: 32 in operation, 4 under repair. Average tractive power: 17,406 kilograms. Industrial: 1 gasoline, 1 oil, both in operation. Fuel consumed (1942): 95,000,000 liters oil and lubricants, 79,000 liters gasoline (including that used for motor rail cars; see "Passenger cars" below).

Freight cars (1944).—483 box (steel framework) in operation, 39 gondolas (steel) in operation, 264 flat (steel) in operation, 4 oil tanks in operation, 50 water tanks in operation and 2 under repair.

Passenger cars (1944).—218 (including 153 motor rail cars) in operation, 23 (including 16 motor rail cars) under repair.

Work cars (1944).—2,719 in operation, 45 under repair.

NOTE.—Much of the above equipment does not actually belong to the Southern Pacific of Mexico. Actually 59 locomotives, 844 freight and work cars, and 59 passenger cars belong to other lines, probably the parent Southern Pacific.

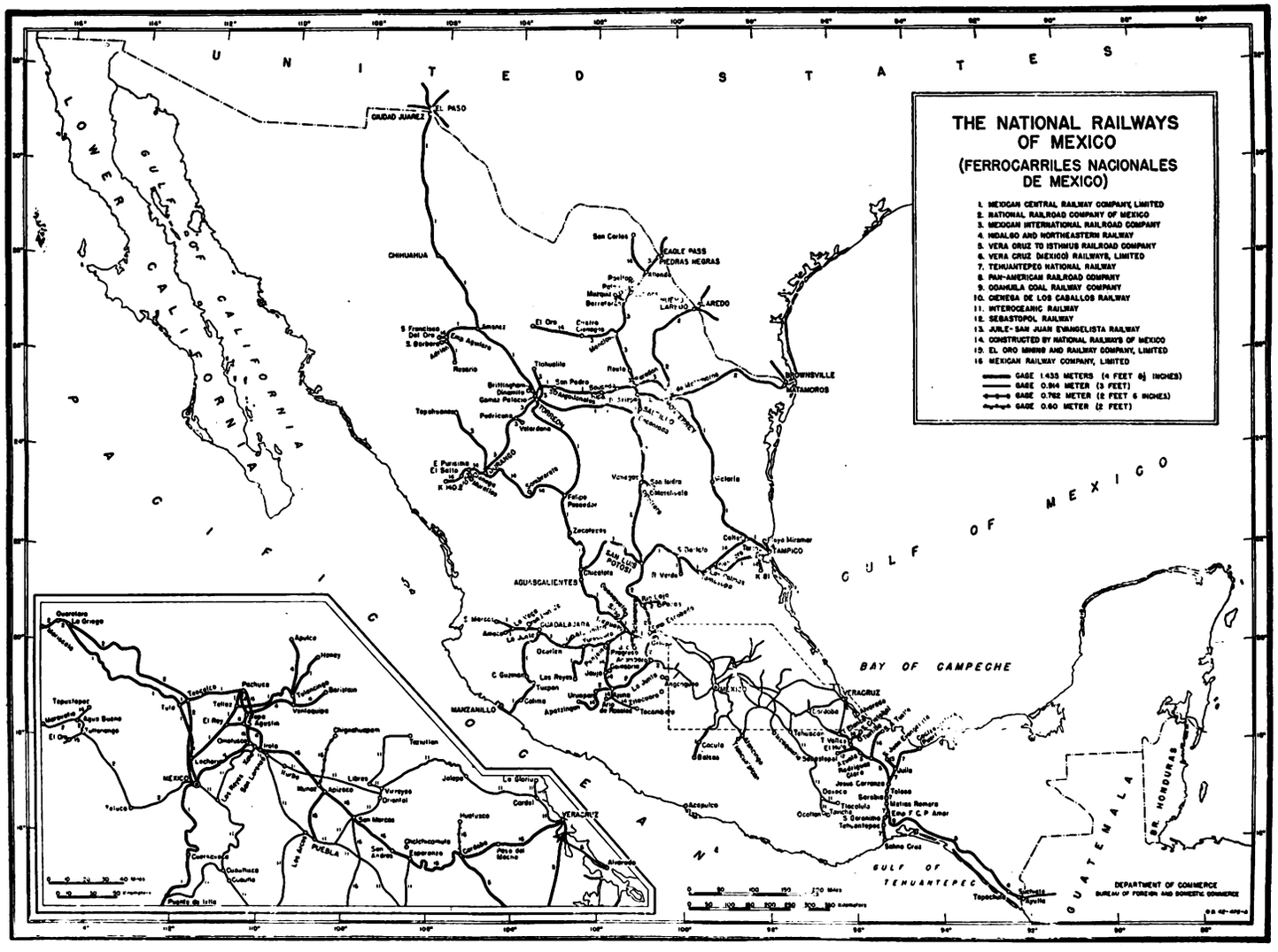
Traffic (1944).—1,350,546 tons (probably metric) of revenue freight, 984,456 passengers, including Government passengers. Average rates: 0.0446 pesos per ton-kilometer, 0.03 pesos per passenger-kilometer.

Financial (1944).—Operating revenues: 44,032,245 pesos. Operating expenses (including taxes): 40,155,380 pesos. Authorized, issued, and paid up capital 105,248,600 pesos.

Employees (1944 average).—7,691.

The United Railways of Yucatan (Ferrocarriles Unidos de Yucatan, S.A.).—General offices at intersection of Calle 55 and Calle 48, Merida, Yucatan, Mexico. Local address: Avenida Baja California 45, Colonia Roma Sur, Mexico, D.F., Mexico.

This railroad system, owned by the State of Yucatan, is completely isolated from any other part of Mexico. The Sureste Railway will, when completed, give rail connection to Mexico City and the north. The area served by the



Digitized by Google

United of Yucatan is Mexico's world-famous henequen country. A number of industrial lines, using animal traction primarily, operate in and from the henequen plantations, bringing the baled sisal fiber to the United of Yucatan, with which they connect.

Permanent way.—Maximum curvature: 4°22′. Maximum gradient: 0.78 percent. Ballast: Red carth, gravel, and crushed rock. A white mineral earth, *Sahcab*, is used on the curves. The road has excellent natural drainage. Ties: Native untreated hardwood. Rails: 30 to 70 pounds per yard, averaging 43 pounds per yard.

Structures.—Bridges: 2 wood. One is between Merida and Progreso, standard gage, the other between Merida and Campeche, narrow gage. Tunnels: None. Roundhouse: La Plancha in northeast section of Merida, 35 tracks.

Locomotives (July 14, 1945).—11 standard-gage in operation, 31 narrow-gage in operation, 5 narrow-gage under repair. All but one (oil) burn wood. Locomotives are old, but in fair condition. Fuel consumed (1942): 84,000 liters oil and lubricants, 9,000 liters gasoline.

Freight cars (December 31, 1944).—Standard gage: 13 box (10-ton), 40 box (20-ton), 2 stock, 2 flat, 1 caboose, 1 tank. Narrow gage: 5 box (10-ton). 167 box (22-ton), 13 stock, 25 flat, 5 cabooses, 9 oil-tanks, 1 auxiliary tank.

Passenger cars (December 31, 1944).—Standard gage: 19, including 3 express, mail, and baggage. Narrow gage: 62, including 11 express, mail, and baggage.

Work cars (December 31, 1944).—Standard gage: 4. Narrow gage: 48.

Other cars (December 31, 1944).—20 cars being rebuilt.

Note.—The United of Yucatan builds all bodies for its box, passenger, and baggage cars, as well as floors for its flatcars. Practically all the materials used are imported from the United States.

Traffic (1944).—350,308 metric tons revenue freight, 2,513,337 revenue passengers. Average rates: 0.09410 pesos per ton-kilometer (1944), 0.0201 pesos per passenger-kilometer (1943).

Financial (1944).—Operating revenues: 5,960,817 pesos. Operating expenses: 5,080,285 pesos. Authorized and paid-up capital: 23,000,000 pesos.

Employees (1944).—1,468.

The Mexico Northwestern Railway (Ferrocarril Noroeste de Mexico).—This railroad was constructed primarily to tap the rich timberland which it serves. In January 1946 it was sold to a Mexican-United States syndicate by the Government, which had acquired it in 1940. Address of the offices is uncertain. Last known address was Edificio Sauer, Rooms 127-221, Avenida 16 de Septiembre, Ciudad Juarez,

Permanent way.—Maximum curvature: 10°30′. Maximum gradient: 3 Mexico.

percent. Ballast: Crushed stone and gravel. Ties: Pinewood. Rails 56, 60, 70, and 80 pounds per yard. Signals: Fixed, stationary (no electric lights).

Structures.—Bridges: 258 wood, 122 concrete and steel. Tunnels: 11. Roundhouses and repair shops: Madera, Pearson, Chihuahua.

Locomotives (1944).—12 freight, 9 mixed, 5 yard, all but one in operation. Average tractive power: 13,803 kilograms. Fuel: Oil. Fuel consumed (1942): 17,000,000 liters oil and lubricants.

Freight cars (1944).—In operation: 364 box, 6 gondolas (steel), 15 gondolas (steel frames), 213 flat (steel), 111 flat (wood), 23 water tanks, 2 oil tanks (wood), 13 oil tanks (steel), 31 stock, 9 cabooses. Under repair: 24 box, 10 gondolas (steel frame), 10 flat (steel), 26 flat (wood), 2 cabooses. Average capacities: From 27,216 kilograms (stock) to 36,290 kilograms (steel gondolas).

Passenger cars (1944).—13 in operation, 2 under repair. Capacities: 60-62 seats. Baggage cars.—7 in operation.

Work cars (1944).—11 in operation, 2 under repair.

Couplers.—Simplex, Towers. Brakes—Air and hand, combined, Stevens, old type.

Traffic (1944).—287,336 metric tons freight, 144,086 passengers. Average rates: 0.0451 pesos per ton-kilometer, 0.0849 pesos per passenger-kilometer.

Financial (1944).—Operating revenues—4,744,166 pesos. Operating expenses: 5,118.354 pesos. Authorized capital: 80,000,000 pesos. Issued: 40,000,000 pesos. Outstanding: 40,000,000 pesos. Price for which railroad was sold this year: About 15,000,000 pesos.

Employees (1944).—817.

The Coahuila & Zacatecas Railway (Ferrocarril Coahuila y Zacatecas).—Owned by Mazapil Copper Co., Ltd., of Manchester, England. Home address: 22 Lloyd St., Manchester, England. Mexican home address: P.O. Box 116, Saltillo, Coahuila, Mexico. Local address: Balderas 32, Mexico, D. F., Mexico.

Permanent way.—Maximum curvature: 10°. Maximum gradient: 4 percent. Ballast: Slag, gravel, earth. Ties: Wood. Rails: 40, 56, 60 pounds per yard, mostly 40 pounds per yard. Signals: Manual train order block.

Structures.—Bridges: 65 temporary, 26 permanent. Culverts: 68 masonry and concrete, 97 corrugated metal, 99 wood, 5 concrete pipe, 18 vitrified clay pipe. Tunnels: None. Roundhouses: Saltillo (12 locomotives), Ciudad del Oro (2 locomotives). General repair shops and power plant: Saltillo.

Locomotives (May 12, 1945).—9 in operation, 2 under repair. Average weight on drivers: 39,286 kilograms. Horsepower: 643. Fuel consumption ture: 8°. Maximum gradient: 2.50 per-(1942): 9,459,000 kilograms coal.

Freight cars (1944).—37 box (25,000 kgs. each), 136 gondola or ore (25,000 kgs. each), 11 fiat (19,833 kgs. each), 7 tanks (19,200 kgs. each), 4 cabooses. All cars reported in operation.

Passenger cars (1944).—11, including 3 motor rail cars, all in operation.

Work gang cars (1944).—11, all in operation. Couplers—Tower. Brakes—Westinghouse.

Traffic (1944).—163,163 metric tons freight (65 percent ores), 50,403 passengers. Average rates: 0.0596 pesos per ton-mile, 0.351644 pesos per passenger-mile.

Financial (1944).—Operating revenues: 1,051,507 pesos. Operating expenses: 1,258,109 pesos. Authorized capital: £1,000,000. Issued: £600,000. Outstanding £400,000.

Employees (1944).—288.

The Nacozari Railway (Ferrocarril de Nacozari).—Owned by Southern Pacific Railroad (U. S.). Chief traffic is in ores and concentrates, and supplies for Moctezuma Copper Co., Nacozari. Home address: Nacozari de Garcia, Sonora, Mexico. Local address: 5 de Mayo. No. 32, Edificio Paris, Mexico, D. F., Mexico.

Permanent way.—Maximum curvaaure: 17°. Maximum gradient: 3 percent. Ballast: Only on 23 km. Ties: 95 percent creosoted pine, 5 percent native untreated hardwood. Rails: 60 to 80 pounds per yard. Signals: Not automatic.

Structures.—Bridges: 91. Culverts: 192. Tunnels: None. Clearance: 16 ft. Roundhouses, repair shops, etc.: None.

Equipment (1944.—1 steam locomotive, 2 boxcars, 85 gondolas or ore cars, 7 passenger cars, all in operation. Other equipment, belonging to parent company, is probably used when needed.

Traffic (1944).—6,192,971 ton-miles freight, 55,243 passengers, 2,536,169 passenger-miles.

Financial (1944).—Operating revenues: $203,998 (U. S.). Operating expenses: $149,525 (U. S.). Authorized capital, all issued: $1,000,000 (U. S.).

Employees (1944).—83.

The Kansas City, Mexico & Orient Railway (Ferrocarril Kansas City, Mexico y Oriente, S.A.).—This railroad was envisioned by its promoters as a short route to the Orient. The potentialities were never realized, however, because of the unfinished section of the line. The Government took over the road in 1940, and has begun work on its completion. References to this construction often speak of the "Chihuahua-Pacific" line, but the name of the road has not been officially changed, so far as is known. Home address: Chihuahua, Chihuahua, Mexico. Local address: Marconi 2, Despacho 39, Mexico D. F., Mexico.

Permanent way.—Maximum curva-

Digitized by Google

cent compensated. Ballast: Probably slag. Ties: Pinewood. Rails: 56-75 pounds per yard, averaging 66 pounds per yard.

Structures.—Roundhouses and repair shops: Chihuahua, La Junta, Mochis. Other information not available.

Equipment (1944).—Locomotives: 7 in operation, 7 under repair, all oil burners in mixed service. Total tractive power: 148,490 kilograms. Fuel consumed (1942): 6,900,000 liters oil and lubricants. Freight cars: 171 box (30,299 kgs. average), 7 gondolas or ore (36,300 kgs.), 27 gondolas or ore (36,200 kgs.), 50 flat (36,200 kgs.), 18 water tanks (30,000 kgs.) (8 other watertanks are listed, but are apparently permanently out of operation), 1 stock, 6 cabooses (10 refrigerator cars are listed, of 10,000 kgs. each, but they are apparently permanently out of operation). Of the total, 26 boxcars, 15 flatcars, and 17 gondolas were understood to be condemned. Passenger cars: 6 (70 seats average), 5 (80 seats), 3 (60 seats), 2 rented (60 seats), 4 express and baggage, 1 special. Of the total, 2 were under repair. Work cars: 56. Gasoline-powered rolling stock: 4 trailers (13 persons), 2 motor cars (85 HP).

Traffic (1944).—12,803 carloads freight carrying 347,706 metric tons, 10,050 metric tons LCL freight, 63,338 passengers. Average rates: 0.0591 pesos per ton-kilometer, 0.0307 pesos per passenger-kilometer.

Financial (1944).—Operating revenues: 1,920,018 pesos. Operating expenses: 2,106,524 pesos. Capital stock issued, subscribed, and paid up: 3,400,000 pesos.

Employees (1944).—493.

The Mexican Northern Railway (Ferrocarril, Mexicano del Norte).—This line is operated primarily to handle ore from the Sierra Mojada lead deposits. Home address: 82 Beaver Street, New York, N. Y. Local address: Avenida 16 de Septiembre, 26, Mexico, D. F., Mexico.

Permanent way and structures.—Maximum curvature: 8°. Maximum gradient: 2.5 percent compensated. Ballast: Earth, slag, and sand. Ties: Oak and pine. Rails: 56 (122 kms.) and 60.5 (14 kms.) pounds per yard. Bridges: 33 reported. Tunnels: None. Workshop: Escalon.

Equipment (1943).—Locomotives: 6 coal burners, 1 oil burner, all in operation. Tractive effort: 2 coal burners 9,738 kilograms each, other 12,541 kilograms each. Fuel consumed (1942): 5,000,000 kgs. coal, 282,000 liters oil and lubricants. Freight cars (all in operation): 8 box (27,200 kgs. average), 22 gondolas or ore (28,855 kgs. average), 1 flat (20,000 kgs.), 7 water tanks, wood (22,710 kgs. average), 4 water tanks, steel (25,738 kgs. average), 1 caboose (20,000 kgs.). Passenger cars (all in operation): 1 (58 seats), 2 (12 seats each), 1 (24 seats), 2 motor rail cars (6 seats each), 1 baggage. Work cars: 11.

Traffic (1943).—7,626 carloads revenue freight carrying 281,623 metric tons, 793 metric tons LCL freight, 2,924 passengers. Average rates: 0.0158 pesos per ton-kilometer, 0.0344 pesos per passenger-kilometer.

Financial (1943).—Operating revenues: 499,023 pesos. Operating expenses: 650,251 pesos. Authorized capital: 6,000,000 pesos. Issued (preferred shares): 1,744,033 pesos. Subscribed: 199,726 pesos. Paid-up: 7,744,033 pesos. Capital account preferred shares are made up of 8,099.7 shares issued under the Reorganization Plan of October 1, 1934, in the amount of $809,970.00 (U. S.), equivalent to 1,744,033.30 pesos.

Employees (1943).—151.

The Sonora-Lower California Railway (Ferrocarril Sonora-Baja California).—Under construction. Home address: Apartado Postal 182, Mexicali, B.C., Mexico. Local address: Direccion Gral. de Construccion de Ferrocarriles, Ministro de Comunicaciones y Obras Publicas, Plaza de la Reforma No. 2, Mexico, D. F., Mexico.

Permanent way and structures.—Maximum curvature: 2°. Maximum gradient: 1 percent. Ballast: None. Ties: 7″ x 8″ x 8′. Rails: 80 and 90 pounds per yard. Signals: Standard. Bridges: Cooper resistance E-50. Tunnels: None. Roundhouses: None. Provisional repair shops: Puerto Penasco.

Equipment (1944).—Locomotives: 1 gasoline, 275 hp. and 1 Diesel, 500 hp. Fuel consumed (1942): 1,138,000 liters oil and lubricants, 25,000 liters gasoline. Freight cars: 2 flat (80,000 lbs. each), 3 tanks (8,000 gallons each). Passenger cars: 4 (100 passengers each).

Traffic (1944).—23,392 metric tons freight, 222,580 passengers. Average rates: 0.091 pesos per ton-kilometer, 0.0416 pesos per passenger-kilometer.

Financial (1944).—Operating revenues: 1,101,843 pesos. Operating expenses: 930,722 pesos.

Employees (1944).—210.

The Southeastern Railway-Campeche Division (Ferrocarril del Sureste-Division Campeche).—Under construction. Home address: Campeche, Campeche, Mexico. Local address: Direccion Gral. de Construccion de Ferrocarriles, Ministro de Comunicaciones y Obras Publicas, Plaza de la Reforma No. 2, Mexico, D. F., Mexico.

Permanent way and structures.—Maximum curvature: 6°. Maximum gradient: 1 percent compensated. Ballast: None. Ties: 7″ x 8″ x 8′. Rails: 65, 80, and 90 pounds per yard. Signals: Standard. Bridges: Cooper resistance E-50. Tunnels: None. Roundhouses and repair shops: Campeche.

Equipment (1944).—Locomotives: 6 oil burners, traction 21,245 pounds each, 1 passenger Diesel, 550 hp., 1 freight Diesel, 330 hp. Fuel consumed (1942): 660,000 liters oil and lubricants. Freight cars: 9 box (80,000 pounds each), 6 metal gondolas, 48 flat (80,000 pounds each), 3 tanks (6,000 and 10,000 gallons), 1 caboose. Passenger cars: No information. Couplers: Standard A.R.A. Brakes: Westinghouse.

Traffic (1944).—17,098 metric tons freight, 77,995 passengers. Average rates: 0.09 pesos per ton-kilometer, 0.025 pesos per passenger-kilometer.

Financial (1944).—Operating revenues: 582,017 pesos. Operating expenses: 1,834,867 pesos.

Employees (1944).—195.

The Southeastern Railway—Puerto Mexico Division (Ferrocarril del Sureste-Division Puerto Mexico).—Under construction. Home address: Coatzacoalcos, Veracruz, Mexico. Local address: Direccion Gral. de Construccion de Ferrocarriles, Ministro de Comunicaciones y Obras Publicas, Plaza de la Reforma No. 2, Mexico D. F., Mexico.

Permanent way and structures.—Maximum curvature: 6°. Maximum gradient: 1 percent compensated. Ballast: None. Ties: 7″ x 8″ x 8′. Rails: 60, 65, and 80 pounds per yard. Signals: Standard. Bridges: Cooper resistance E-50. Tunnels: One. Clearance: 22″ standard A.R.E.A. Roundhouse: Coatzacoalcos. Provisional repair shops: Allende.

Equipment (1944).—Locomotives: 2 oil burners, 3 diesel switchers, 1 gasoline. Fuel consumed (1942): 880 liters oil and lubricants, 10,735 liters gasoline. Freight cars: 18 flat. Passenger cars: 2. Work cars: 2 inspection motor cars. All equipment used belongs to National Railways of Mexico.

Traffic (1944).—8,803 metric tons freight, 133,520 passengers. Average rates: 0.1135 pesos per ton-kilometer, 0.0307 pesos per passenger-kilometer.

Financial (1944).—Operating revenues: 267,505 pesos. Operating expenses: 1,201,633 pesos.

Employees (1944).—410.

The Inter-California Railway (Ferrocarril Inter-California).—This road is a subsidiary of the Southern Pacific (U. S.). Home address: Avenida Francisco I. Madero 352, Mexicali, B. C., Mexico. Local address: Edificio Paris, Avenida 5 de Mayo 32, Mexico, D. F., Mexico.

Permanent way and structures.—Maximum curvature: 7°30″. Gradient: Level. Ballast: Rock. Ties: Creosoted pine. Rails: 90 pounds per yard on main line, 80 and 62 pounds per yard on sidings. Bridges: 18 wood, 1 on concrete piers with steel girders. Tunnels: None. Roundhouses, shops, etc.: None.

Equipment.—All is leased from parent company.

Digitized by Google

Traffic (1944).—2,961,018 metric tons, 301,024 passengers.

Financial (1943).—Operating revenues: 3,885,472 pesos.

Employees (1944).—111.

The Tijuana and Tecate Railway (Ferrocarril de Tijuana y Tecate, S.A.).—This road is a division of the San Diego and Arizona Eastern Railroad, a subsidiary of the Southern Pacific system. The resident engineer is located in San Diego., Calif.

Permanent way and structures.—Maximum curvature: 716′ radius. Maximum gradient: 1.4 percent. Ballast: Gravel. Ties: 7″ x 9″ x 8′. Bridges: 13. Tunnels: 4.

Equipment.—Generally that of parent company.

Traffic (1942).—101,354 metric tons, 154,717 passengers.

Financial (1942).—Operating revenues: 671,972 pesos. Operating expenses: 441,747 pesos.

Employees (1942).—93.

The Rio Mayo Railway (Ferrocarril Rio Mayo, S.A.).—This road is now held by the Mexican Government, but litigation is going on in an effort of the former owner to recover control. Address: Madereros No. 93, Mexico, D. F., Mexico (Certain passenger and freight offices are in Navajoa, Sinaloa, Mexico).

Permanent way and structures.—Ballast: Dirt and river rock. Ties: Wood. Rails: 65 pounds per yard (63 kms.) and 50 pounds per yard (7 kms.). Bridges: 13 wood (need repair), 2 concrete, 3 others. Tunnels: None. Signals: Hand. Repair shop: Navajoa.

Equipment (1943).—Locomotives (all oil): 3 in operation, 1 under repair. Condition bad. Fuel consumed (1942): 359,000 liters oil and lubricants. Freight cars: 13 box, 1 gondola, 5 flat, 2 water tanks, 1 caboose in operation; 8 box, 6 stock, 1 caboose under repair. Capacities: 25,000 kgs. per tank, 6,000 kgs. per caboose, 30,000 kgs. each per all others. Passenger cars: 1 (84 seats) in operation, 3 (average 60 seats) under repair, 1 express, mail, and baggage in operation. Work cars: 7 in operation, 1 under repair. Couplers and brakes: Similar to United States standards.

Traffic (1943).—3,430 carloads carrying 73,816 metric tons freight, 80 metric tons LCL freight, 6,407 passengers. Average rates: 0.1117 pesos per ton-kilometer, 0.0271 pesos per passenger-kilometer.

Financial (1943).—Operating revenues: 338.535 pesos. Operating expenses: 260,432 pesos. Capital stock authorized, issued, subscribed, and paid-up: 2,919,000 pesos. The stock was issued August 2, 1926, in the amount of 2,919,000 pesos and 2,919 shares were sold at 100 pesos each. Of these, 1,127 were made out to bearer and 1,792 were registered.

Employees (1943).—67.

The Minatitlan to El Carmen Railway (Ferrocarril Minatitlan a El Carmen).—This line is one of four owned by the semi-autonomous Government corporation Petroleos Mexicanos. The other three are purely industrial lines, but the Minatitlan is a common carrier, operated under Federal concession. Address: Petroleos Mexicanos, Avenida Juarez 94, Mexico D. F., Mexico.

Permanent way and structures.—Maximum curvature: 7°30′. Maximum gradient: 1.6 percent. Ballast: Gravel and broken stone. Ties: Oak. Rails: 80 pounds per yard (1 kilometer has 55-lb. rails). Bridge: One. Tunnels: None. Workshop: Pemex Refinery.

Equipment (1944).—Locomotives (oil): 4 in operation, 1 under repair. Two have a tractive effort of 9,004 kgs. each, and the others 7,085 kgs. each. Fuel consumed (1942): 784,000 liters oil and lubricants. Freight cars: 25 box, wood (average 27,200 kgs.), 8 box, steel frame (average 40.898 kgs.), 25 oil tanks (average 39.805 kgs.). Eight of the boxcars belong to other lines. Passenger cars: 2, average capacity 63 seats.

Traffic (1944).—12,548 carloads carrying 426,375 metric tons freight, 1,103 metric tons LCL freight, 45,339 passengers. Average rates: 0.0542 pesos per ton-kilometer, 0.0432 pesos per passenger-kilometer.

Financial (1944).—Operating revenues: 277.461 pesos. Authorized capital: 300,000 pesos.

Employees (1944).—43.

The Potosi and Rio Verde Railway (Ferrocarril de Potosi y Rio Verde).—Although it carries passengers, this line is primarily an industrial railway, carrying ore from the San Pedro mines to the smelter in San Luis Potosi. It is owned and operated by the American Smelting & Refining Co. Home address: 120 Broadway, New York, N. Y. Local address: Apartado Postal No. 132, San Luis Potosi, S.L.P., Mexico.

Permanent way and structures.—Maximum curvature: 14°. Maximum gradient: 3 percent compensated. Ballast: Rock. Rails. 30 and 40 pounds per yard. Repair shop: San Luis Potosi.

Equipment (1944).—Locomotives: 3 oil. Fuel consumed (1942): 776,000 liters oil and lubricants. Freight cars: 6 box, 80 gondolas, 8 rack, 2 water tanks, 3 cabooses. Passenger car: one.

Traffic (1944).—214,352 metric tons ore, fire wood, charcoal, burnt lime, 19.621 passengers.

Employees (1944).—112.

The Western Railway Co. of Mexico, Limited (Ferrocarril Occidental de Mexico).—This line is owned by the Cia. Desarrolladora Mexicana, S. A. Address: Calle de Epitacio Osuna, Culiacan, Sinaloa, Mexico.

Permanent way and structures.—Gradient: 1°58′. Ballast: Dirt. Ties: Hewn wood. Rails: Total weight 2,633, 720 kilograms. Bridges: 22. Culverts: 9, masonry. Tunnels: None. Shops: Culiacan.

Equipment (1943).—3 wood burning in operation, 1 under repair, tractive power 52,279 kgs. Freight cars: 6 box (90,000 kgs.), 18 flat (270,000 kgs.). Passenger cars: 1 (60 seats), 1 motor rail car (30 seats), 1 trailer. Fuel consumed (1942): 14,060 liters gasoline.

Traffic (1943).—62,300 metric tons carload freight, 104 metric tons LCL, freight, 25,012 passengers. Average rates: 7 centavos per ton-kilometer 2 centavos per passenger-kilometer.

Financial (1943).—Operating revenues: 109,180 pesos. Operating expenses: 121,598 pesos. Capital subscribed: 50,000 pesos.

Employees (1943).—42.

The Chalchicomula Railway (Ferrocarril de Chalchicomula).—Address: Ejido 19, Desp. 17, Mexico, D. F., Mexico.

Permanent way and structures.—Maximum curvature: 500 meters radius. Maximum gradient: 1.4 percent. Ballast: Dirt. Ties: Okote pine. Rails: 70 pounds per yard. Signals: Not automatic. Bridges: 2. Culverts: 2. Tunnels: None. Workshop: Chalchicomula.

Equipment (1942).—Locomotives: 3 wood burners, 2 oil burners. Average tractive power: 2,078 kgs. Freight cars: 7 box (5,000 kgs. each), 10 flat (5,000 kgs. each), 3 stock (5,000 kgs. each), 1 gondola (700 kgs.), 1 oil tank (1,400 kgs.), 2 motor (4.000 kgs. each). Passenger cars: 9 (18 seats each), 1 (32 seats), 3 express, mail, and baggage, 3 special, 3 motor rail cars (18 seats each). Work cars: 3. Fuel consumed: 7,000 liters gasoline.

Traffic (1942).—6,795 metric tons freight, 28,577 passengers. Average rates (1941): 14.31 centavos per ton-kilometer, 2.83 centavos per passenger-kilometer.

Financial (1942).—Operating revenues: 20,646 pesos. Operating expenses: 28,882 pesos.

Employees (1942).—29.

The Mexico Pacific Railway (Ferrocarril Mexicano del Pacifico).—This is primarily an industrial line, built to carry sugarcane from the fields to the sugar mill in Los Mochis. It operates under Federal concession and is owned by the United Sugar Companies, S. A. Address: Los Mochis, Sinaloa, Mexico.

Permanent way and structures.—Maximum curvature: 60 feet radius. Maximum grade: 1.5 percent. Ballast: None. Ties: Native wood. Rails: 56 and 60 pounds per yard. Signals: None; trains despatched by telephone. Bridges: 27 small, wood. Tunnels: None. Roundhouse and repair shop: One.

Equipment (1944).—Locomotives: 3 oil, 1 wood, in operation 6 months per

Digitized by Google

year. Fuel consumed (1942): 400,000 liters oil and lubricants. Freight cars: 1 box (100,000 pounds), 3 gondolas (100,000 pounds each), 4 flat (60,000 pounds each), 1 oil tank (80,000 pounds), 5 oil tanks (100,000 pounds each), 100 special cane cars (80,000 pounds each). Passenger cars: None.

Traffic.—About 6,000 metric tons annually. Average rate: 0.260 pesos per ton-kilometer.

Financial. — Operating revenues: About 35,000 pesos annually. Operating expenses: About 47,600 pesos annually. The parent company makes up the deficit. Authorized and subscribed capital: 50,000 pesos.

Employees.—30, excluding company officials.

The Camargo and Western Railway (Ferrocarril de Camargo y Oeste).—This is an industrial line, operated under Federal concession by the Cia. Nacional de Electricidad, S. A., a subsidiary of the Electric Bond & Share Co., New York. Home address: Apartado 8, Ciudad Camargo, Chihuahua, Mexico. General offices: Edificio Electrico, Calle Valdes Carillo y Ave. Juarez, Apartado 141, Torreon, Coahuila, Mexico. Local address: Bolivar No. 21, Mexico, D. F., Mexico.

Permanent way and structures.—Maximum curvature: 8° Maximum gradient: 3.5 percent compensated. Ballast: Dirt. Rails: 56 pounds per yard average. Bridges: 24. Tunnels: None. Repair shop: Boquilla.

Equipment (1944).—Locomotive: 1. Fuel consumed (1942): 217 liters oil and lubricants. Freight cars: 5 gondolas, 4 flat, 2 autocars, 4 pushcars, 1 express pushcar. Fuel consumed (1942): 9,550 liters gasoline. Passenger cars: 4.

Traffic (1944).—No freight. Express: 587,432 kgs. Passengers: 31,924. Average fare: 0.0185 pesos per passenger-kilometer.

Financial (1944).—Operating revenues: 18,168 pesos. Operating expenses: 82,567 pesos. Invested capital: 380,000 pesos.

Employees (1944).—25.

The Quintana Roo Forest Railway (Ferrocarril Forestal de Quintana Roo).—Address: Felipe Carrillo Puerto, Quintana Roo, Mexico.

Ballast: Crushed rock. Ties: Hardwood. Rails: 24 pounds per yard. Repair shop: Carrillo Puerto.

Equipment (1943).—One motor car (22,000 liters gasoline consumed in 1942), 12 wood flat cars (1,000 kgs. each).

Traffic (1943).—1,103 metric tons freight at average of 0.5243 per ton-kilometer, 790 passengers, at average of 0.0428 pesos per passenger-kilometer.

Operating revenues (1943).—33,548 pesos. Operating expenses (1943): 33,328 pesos. There is no capital stock, the road being the property of the Territory of Quintana Roo.

Employees (1943).—15.

Industrial Railways

There are several industrial railroads operating in Mexico which, since they are not common carriers, do not hold Federal concessions. Statistics of these lines are not published by the Ministry of Communications and Public Works. The information listed below was gathered by United States foreign service representatives. It refers to 1944, unless otherwise stated.

The Cobos to Furbero Railway (Ferrocarril Cobos a Furbero).—Owned by Petroleos Mexicanos. Home address: Apartado 1, Poza Rica, Vera Cruz, Mexico. Local address: Avenida Juarez 92-94, Mexico, D. F., Mexico.

Route length.—82 kms. Gage: 0.609 meter. Maximum curvature: 144 meter radius. Maximum gradient: 2.5 percent. Ties: Steel. Rails: 12.4 kilograms per meter (77 km.), 24.8 kilograms per meter (5 kms.). Signals: Telephone. Bridges: 123. Tunnels: One. Shops: Poza Rica. Locomotives: 8 caterpillar Diesel freight (10 tons, 80 hp.), 2 Deutz Diesel freight (10 tons 80 hp.), 1 Drewry Diesel freight (5 tons, 50 hp.). Rolling stock: 1 passenger car (42 seats), 8 motor rail cars (25 hp.), 3 trailers, 1 gondola, 6 handcars, 17 flatcars, (15 ton), 40 flatcars (18 ton), 1 flatcar (24 ton), 10 tank cars for petroleum derivatives (6 to 12 cubic meters). Freight: About 35,000 metric tons annually.

Operating expenses (1944).—965,000 pesos.

Employees.—112.

The San Geronimo to Cerro Azul Railway (Ferrocarril de San Geronimo a Cerro Azul).—Owned by Petroleos Mexicanos. Home address: Cerro Azul, Vera Cruz, Mexico. Local address: Avenida Juarez, 92-94, Mexico, D. F., Mexico.

Route length.—48 kms. Gage: 0.914 meter. Maximum gradient: 3 percent. Ballast: None. Ties: Hardwood. Rails: 40 pounds per yard. Bridges: 21. Roundhouse and repair shop: Cerro Azul. Locomotives: 1 in operation, 2 under repair. Rolling stock:: 6 motor rail cars in operation and 1 under repair, 1 trailer in operation, 1 boxcar in operation and 1 under repair (15 tons), 14 flatcars in operation and 3 under repair (15 tons). Freight: About 800 metric tons monthly. Passengers: About 1,200 monthly.

Operating expenses.—About 4,800 pesos per month.

Employees.—23.

The Alamo to Zapotal Railway (Ferrocarril Alamo a Zapotal).—Owned by Petroleos Mexicanos. Home address: Alamo, Vera Cruz, Mexico. Local address: Avenida Juarez 92-94, Mexico, D. F., Mexico.

Route length: 21 kms. Gage: 0.609 meter. Ballast: None. Ties: Hardwood. Rails: 40 pounds per yard. Bridges: 9. Repair shop: Alamo. Locomotives: 1 Diesel freight in operation, 1 under repair. Rolling stock: 3 motor rail cars in operation and 2 under repair; 10 flatcars (10 tons). Freight: About 125 metric tons monthly.

Operating expenses.—About 200 pesos monthly.

Employees.—10.

The Cananea Consolidated Copper Co. Railway.—Owner is subsidiary of Greene Cananea Copper Co., which in turn is controlled by Anaconda Copper Co. of New York. Home address: Cananea, Sonora, Mexico. Local address: Calle Gante 15-432, Mexico, D. F., Mexico. Route length: About 16 km. Gage: 0.914 meter and 1.435 meters. Maximum curvature: 12°. Maximum gradient: 4.25 percent. Ballast: Broken slag, broken rock, and dirt. Ties: Pine and mesquite. Rails: 50, 60, 65, 70, and 75 pounds per yard. Bridges and tunnels: None. Roundhouses: Cananea. Locomotives: 1 standard-gage in operation and 1 under repair (60 and 65 tons), 4 narrow-gage in operation and 2 under repair (35, 40, and 50 tons). Rolling stock: 6 narrow-gage wood boxcars, 84 narrow-gage gondolas, 18 narrow-gage steel flatcars, 7 narrow-gage wood flat cars, 1 standard-gage wood flatcar, 2 coke wood racks (capacities of cars: 25 tons each, except standard-gage flatcar which holds 50 tons).

Freight.—734,945 tons.

Employees.—28.

The Mine Railway (Ferrocarril de la Mina).—Owned by Moctezuma Copper Co., a subsidiary of Phelps Dodge Corp., 40 Wall Street, New York, N. Y. Home address: Nacozari, Sonora, Mexico.

Route length: About 8 kms. Gage: 0.914 meter. Maximum gradient: 4.47 percent Ballast: Native soil. Ties: Pine. Rails: 60 and 80 pounds per yard. Tunnels: 2. Viaduct: 1. Locomotives: 2 freight in operation (70 tons). Rolling stock: (all in operation): 3 boxcars (16,000 lbs. each), 44 gondolas or ore cars (22,000 lbs. each), 10 flatcars (16,000 lbs. each), 2 tank cars (2,000 gallons, 10,000 lbs. each). Couplers: Jenni. Brakes: Westinghouse. Freight: 439,234 short tons.

Operating expenses.—$34,807 (U. S.).

Employees.—12, not including supervisors.

The Beristain-Necaxa Railway (Ferrocarril Beristain-Necaxa).—Owned by Mexican Light and Power Co., a Canadian corporation. Its purpose is the haulage of supplies to the dam in Necaxa. Home address: Necaxa, Puebla, Mexico. Local address: Gante No. 20, Mexico, D. F., Mexico.

Route length.—37 kms. Gage: 0.914 meter. Maximum curvature: 17 meter

Digitized by Google

radius. Maximum gradient: 6.2 percent. Ballast: Stone. Ties: Concrete, wood. Rails: 40 pounds per yard. Signals: Telephone. Roundhouse: Necaxa. Locomotives (all in operation), 2 Porter steam (16 tons), 2 Shay steam (33 tons), 1 Whitcomb gasoline (4.5 tons). Rolling stock: 2 wood boxcars (10 tons each), 2 wood boxcars (20 tons each), 1 steel boxcar (10 tons), 20 steel flatcars (5-25 tons each), 1 tank car, 1 dump car, 5 passenger cars (5-41 seats each). Freight: 4,486 tons.

Passengers.—21,270.

Employees.—44.

The Tepuxtepec-Lerma Railway (Ferrocarril Tepuxtepec-Lerma).—Owned by Mexican Light and Power Co. Location: State of Michoacan.

Total track.—About 4 kms. Gage: 0.914 meter. Equipment: 1 gasoline locomotive, 1 car.

Operating expenses (1945).—9,649 pesos.

Street Railways

Electric street railways are known to be in operation in Mexico City, Vera Cruz, Tampico, and Torreon. They operate under Federal concession. Data are for 1944.

The Mexico City Tramways Co. (Compania de Tranvios de Mexico, S.A.).—Owned by Canadian capital. Address: Calle de Dr. Lavista No. 164, Mexico, D. F., Mexico. Track length: 308 kms. Gage: 1.435 meters. Passengers: 241,096,860 at 0.6007 pesos (average) per kilometer.

Operating revenues.—17,267,235 pesos.

Operating expenses.—14,262,504 pesos.

The Urban and Suburban Cooperative Transport of Vera Cruz, S. C. L. (Cooperativa de Transportes Urbanos y Suburbanos de Veracruz, S. C. L.).—Operated by a cooperative of the employees. Address: Uribe 217, Vera Cruz, Mexico. Route length: 21 kms. Gage: 1.435 meters. Equipment (condition reported poor): 30 trolley cars in operation and 6 under repair, 3 platform cars. Passengers: 22,475,876 at 0.02 pesos (average) per km.

Operating expenses.—96,665 pesos.

Authorized and issued capital.—791,635 pesos.

Employees.—187.

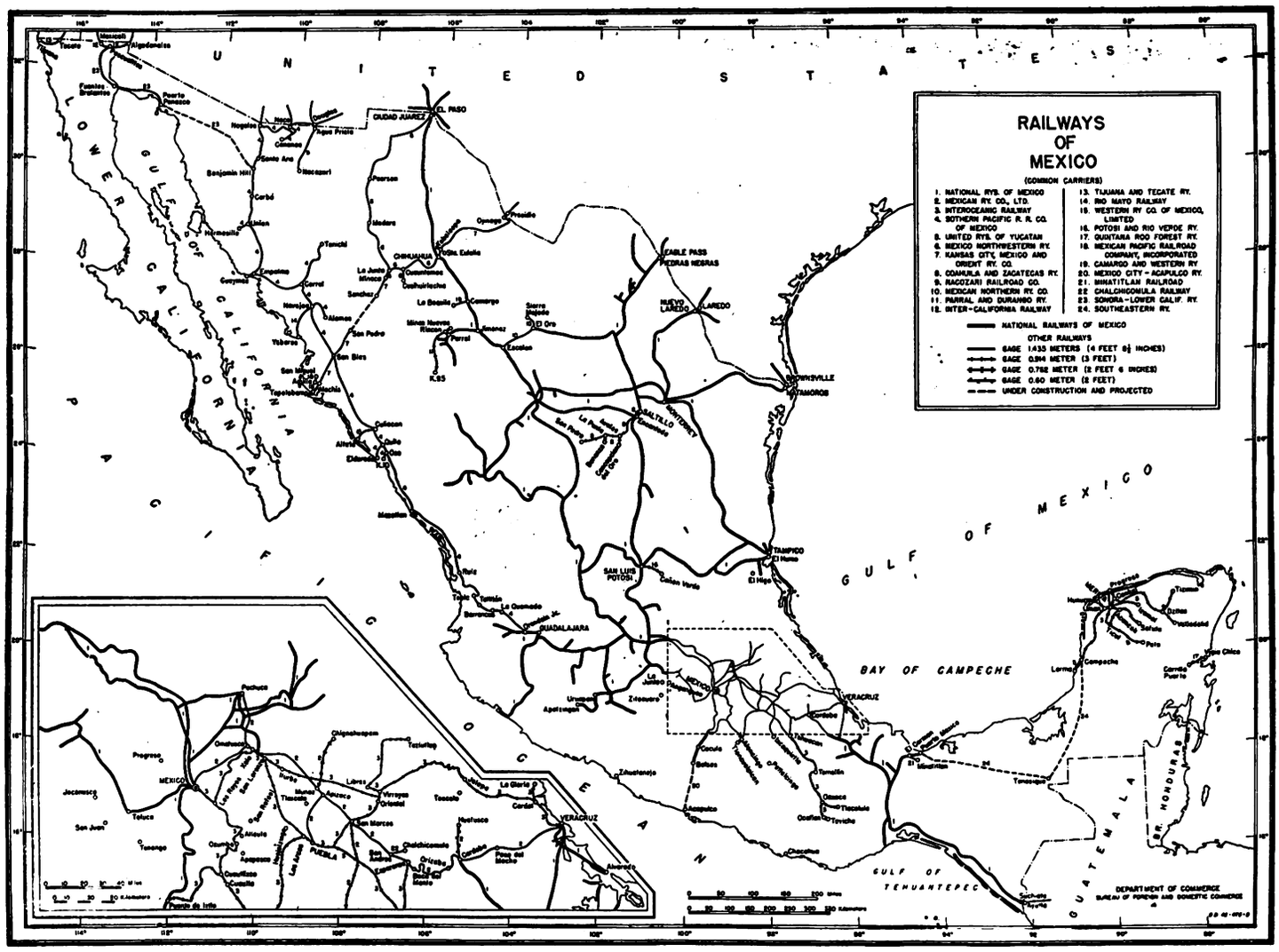
The Tampico to La Barra Electric Railway (Ferrocarril Electrico de Tampico a La Barra).—Owned by Cia. Electrica de Tampico, a subsidiary of *Empresas Electricas Mexicanas,* which is associated with the Ebasco International Corporation of New York. Negotiations are believed in progress, for sale of line to a cooperative formed by the employees. Address: Edificio Luz, Tampico, Tamaulipas, Mexico. Route length: 19 kilometers. Gage: 1.435 meters. Equipment: 14 trolley cars, 1 electric freight locomotive, 10 trailers, 2 flatcars, 2 tank cars. Passengers: 7,098,377 at about 0.02 pesos (average) per kilometer.

Operating revenues.—882,833 pesos.

Operating expenses.—838,512 pesos. Capital value: 4,500,000 pesos.

Employees.—103.

The Lerdo-Torreon Electric Tramway, S. C. L. (Ferrocarril Electrico de Lerdo a Torreon, S. C. L.).—Owned by cooperative of employees. Address: Independencia Pte. 302, Gomez Palacio, Durango, Mexico. Route length: 11.5 kilometers. Gage: 1.435 meters. Equipment: 40 cars (of which 20 are motor),



Digitized by Google

9 boxcars, 6 flatcars (motor). About half of the equipment is in use. The balance is stripped down, the parts being used to repair the operating equipment.

Operating revenues.—About 40,000 pesos monthly.

Employees.—About 90.

Miscellaneous Railways

Two other railways operate in Mexico which do not fall readily into any of the above categories. Figures are for 1944.

The Cardenas to Rio Grijalva Railway (Ferrocarril de Cardenas al Rio Grijalva).—This line, owned by private Mexican capital, is a Federal-concession street railway that employs animal traction. Home address: Cardenas, Tabasco, Mexico. Local address: Edison 67-2, Mexico, D. F., Mexico. Route length: 6 kilometers. Gage: 0.914 meter. Equipment: 1 passenger car in operation (50 seats), 7 flatcars (5,000 kgs.), of which 3 are out of operation. Passengers: 3,687 at 0.05 pesos (average) per kilometer. Freight: 2,598 metric tons at 0.84 pesos (average) per kilometer.

Operating revenues.—14,157 pesos.

Operating expenses.—14,279 pesos.

Employees.—10.

The Boleo Company Railroad and Cableway (Ferrocarril y Cablevia Aerea de la Compania del Boleo, S.A.).—Owned by French stockholders. It appears that the local company is in process of liquidation. Service since 1934, when the Cableway was installed, is reported to have been entirely satisfactory. Home address: Santa Rosalia, Baja California, Mexico. Local address: 4a de la Palma No. 45, Mexico, D. F., Mexico. Gage: 0.914 meter. Locomotives (August 1945): 5 freight in operation and 1 under repair. Rolling stock (all in operation) (August 1945): 5 boxcars, 184 gondolas or ore cars, 32 flatcars, 2 tank cars, 184 mining cars. Couplers: Chain. Brakes: Hand. Freight: About 200,000 metric tons annually, copper being principal commodity.

Employees.—35.

Cable-Length: 5,000 meters. Buckets: 56. Capacity: 800 kilograms per bucket, 45 metric tons per hour on cable, 250 metric tons in ore bins at each end.

Other Railways

The following list includes all railways which are known or believed to be in operation in Mexico, but which have not been discussed above, because of a lack of data:

The Colima Lumber Company Railway.—Located in Colima, Colima.

The Conchos Railway.—Located in Chihuahua.

The El Paso to Juarez (Street) Railway.—Located in United States, connecting with Mexico Northwestern Railway at the international bridge. Main office: 300 East 6th Street, El Paso, Texas.

The Guarda Nepantla Railway.—No information.

The Hornos Railway.—Believed located in Coahuila.

The Ixtaccihuatl Railway.—Believed located in State of Puebla.

The Ixtapa Industrial Railway.—Authorization for taking up track now in process.

The Ixtlahuaca Railway.—Believed located in the State of Mexico.

The Manzanillo to Colima Railway.—Believed located in Colima, Colima.

The Mapimi Railway.—Believed located in Durango, Durango.

The Pagaza to Tlaquiltenango Railway.—Industrial line of Zacatepec Sugar Mill.

The Panuco Mountain and Monclova Railway.—Believed located in Chihuahua, Chihuahua.

The Potosi-Chihuahua Industrial Railway.—Believed located in State of Chihuahua.

The Potosi Industrial Railway.—Operates between Santa Eulalia and Chihuahua (about 15 miles).

The San Nicolas Farm Railway.—Believed located in State of Mexico.

The San Pascual of Minas Adargos Railway.—Believed located in State of Chihuahua.

The Naica Mines Railway.—Operates between Conchos and Naica, Chihuahua.

The Zacatecas-Tlaltenango Railway.—Believed located in State of Zacatecas.

☆U. S. GOVERNMENT PRINTING OFFICE: 1946—707796—98

Digitized by Google

Documents Room
International Trade Office

Industrial Reference Service

U. S. DEPARTMENT OF COMMERCE, W. AVERELL HARRIMAN, *Secretary*

Office of Domestic Commerce, H. B. McCOY, *Director*

Part 1. TRANSPORTATION and PUBLIC UTILITIES

INDIANA UNIVERSITY
JAN 16 1947
LIBRARY

Available in Parts Covering Selected Services and Commodities
Annual Subscription $1.50. Price this report 5 cents
For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., or any of the Department's Field Offices

Volume 4—Part 1 November 1946 D 17431 Number 24

AIR-CARGO POTENTIALS



between the

U. S. and CUBA

Prepared by

TRANSPORTATION DIVISION

JAMES C. NELSON, Chief

Digitized by Google

Air-Cargo Potentials Between the United States and Cuba

By Alice K. Kean

Cuba, the largest of the West Indian Islands, lies approximately 90 miles south of Key West, Fla. The island is about 60 miles wide and stretches 780 miles across the Caribbean Sea. It is estimated that one-fourth of Cuba's total area is covered by mountains which lie principally along the southeast coast. Other smaller groups are found throughout the central territory and along the northern coast. A large portion of this rough terrain is covered by valuable hardwood forests. Although Cuba has many rivers, there are no important navigable waterways.

A semitropical climate, which is moderated by sea breezes, nurtures various tropical crops and attracts vacationers to the beaches and metropolitan areas. In 1943, 54 percent of the island's 4,778,583 inhabitants lived in the provinces of Habana and Oriente.

Cuba is a republic and its governmental framework is comparable to that of the United States. Revenue and protective custom duties are important sources of the Federal Government's income.

Cuba has a predominantly one-crop agricultural economy—the production of sugar. As a result, the island's prosperity is dependent upon the volume and price of its sugar product on the international market. Other important export commodities are molasses, tobacco, fruits and vegetables, rum and spirits, and minerals. From 1937 to 1939 the United States received an average of 78 percent of Cuba's total exports, by value.

From 1937 to 1939 the United States supplied approximately 71 percent of the value of the island's imports. The principal export commodities are foodstuffs, textiles, machinery and automotive equipment, chemicals, and pharmaceuticals. Trade between the United States and Cuba is influenced by the Reciprocal Trade Agreement under which both countries grant preferential tariff rates on the dutiable commodities of the other.

Since 1939, Cuba's export balance has increased and its general standard of living has improved considerably. Additional national income from tourist trade is expected to ease the changes which may come from reduced export trade. Unless the sugar market suffers a severe downward trend in contrast to the wartime prosperity, authorities anticipate that many consumer goods previously considered semiluxury articles will move more or less permanently into the classification of necessities. Cuba's industrial development, however, has been accelerated in recent years and this development may counteract partially the increased demands for imports.

> Countries on which reports of this series have been issued to date include Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, Guatemala, Honduras, Mexico, Paraguay, Peru, Union of South Africa, Uruguay, U. S. S. R. and Venezuela.

The Cuban Government has attempted to increase economic security through a program of industrial and agricultural diversification. Cultivation of coffee, rice, beans, peanuts, and corn has been increased and new industries, including nickel mining, pharmaceutical production, tire and tube production, and food dehydration, have been promoted since 1941. At present, considerable capital is being invested in the textile industry.

Cuba has more than 3,785 miles of railroads. Two principal lines cover almost the entire length of the island and from these many shorter lines branch out to the north and south. A number of private railroads are maintained by the sugar companies.

In addition, the Republic has over 2,000 miles of highways. The Central Highway has been an indispensible factor to Cuba's economic development. This road runs almost the entire length of the island and is being expanded into the isolated rural districts.

A significant effect of the war is the emphasis on aviation in Cuba. In 1938 Cuba's entire import air-express shipments weighed 52,605 pounds; the exports weighed 17,147 pounds. Although no comparable statistics on Cuba's total air shipments are available for 1944 and 1945, some conception of their tremendous increase during the war may be obtained by noting the air-express trade which the United States alone carried on with Cuba in those years.

During the 3-month period, May through July 1945, Cuba imported 354,743 pounds of commodities by air from the United States, and for the 12-month period, July 1944 through June 1945, Cuba shipped by air 665,442 pounds of cargo to the United States. (See table 2).

Increased demands for both passenger and cargo air service during the last few years have stimulated interest in the construction of new airports and in the expansion of existing fields.

Background of Series

The appendix contains an explanation of the purpose of this series of reports on air-cargo potentials. It gives a description of the criteria applied in selecting the commodities classified as potentials. It is suggested that readers consult the appendix for the methods used and for factors to be considered in formulating conclusions based on the data contained in any individual report of the series.

In all cases, it should be noted that the statistics in the reports refer to air-cargo *potentials* and not to predictions of the cargo that will move by air in the future, nor to data on cargo that actually was carried by air in the past. Failure to observe this fact has led to misinterpretation of the figures in these reports on some occasions.

Particular attention should be given to the bases for selection of commodities according to the following categories: Fragility, perishability, and style or obsolescence characteristics. In making these studies, all of the commodities falling within these categories have been treated as air-cargo potentials regardless of value per pound However, an analysis of the value per pound of individual commodities should nevertheless be made to determine whether all of the items included can be properly considered as potential air cargo under the cost, competition, and equipment conditions of the immediate future.

For instance, it is unlikely that such cargo as bananas will be shipped in volume by air in the near future in view of their 1939 value of approximately $0.02 per pound. The same consideration might apply to pineapples which had a value per pound of $0.01 in that year, and to low-priced export items such as pork, lard, or dynamite. However, all of these commodities have been included in their respective categories for the sake of statistical completeness.

Attention is called also to the listing of commodities by value of groups. These studies, aside from the three special groups, include only articles valued at $0.50 or more per pound. While the higher-valued articles probably will make up a major portion of air cargoes, especially during the early development of this trade, values as low as $0.25 per pound are being con-

Digitized by Google

sidered in similar studies as indicating potential air cargo, and some cargo with as low or lower values per pound actually does move by air under present conditions.

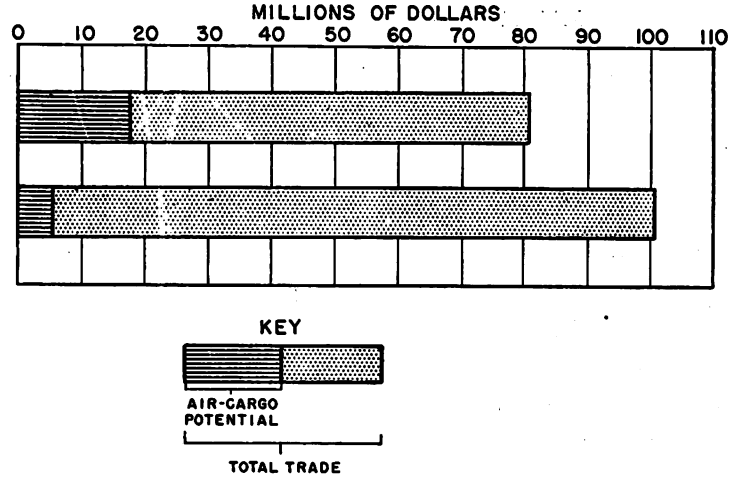
Potential Air Cargoes

In 1939, Cuba's foreign trade, upon which the island's economy depends, had an export balance of $41,814,000. Total exports were valued at $147,676,000 and total imports amounted to $105,862,000. During that year, United States exports to Cuba totaled $80,829,886 and United States imports from Cuba were evaluated at $101,085,555.

Table 1 shows the relation between the total United States trade with Cuba in 1939 and those items which have been selected as air-cargo potentials. (See also chart 1.)

CHART I

TOTAL VALUE OF UNITED STATES TRADE WITH CUBA COMPARED WITH AIR-CARGO POTENTIALS, 1939



46-364

Total trade between the United States and Cuba in 1939, was valued at $181,915,441, with United States imports 25 percent greater by value than exports. In the potential air-cargo trade, as illustrated in table 1, the exports are estimated to have a value of $17,682.666, or about 3¼ times greater than that of imports. In terms of weight, on the other hand, potential imports are estimated to be 2¼ times greater than exports. This excess in weight of the potential air imports is accounted for by the inclusion of bananas, pineapples, and tomatoes on the potential air-imports list. All three of these items, which have been included because of their perishability, have low values per pound. To a lesser extent, the weight shown for potential exports is similarly distorted by low valued items, in this case particularly lard and glass bottles.

In 1939, Cuba ranked second after Canada in the value of United States exports to Western Hemisphere countries; in the same year, the value of United States imports from Cuba ranked third after Canada and Brazil. However, only 12.7 percent of the total trade between the two countries could be listed as air-cargo potentials on the basis of the criteria herein employed. Nearly three-fourths of the United States imports from Cuba in 1939 consisted of sugarcane which did not come under any of these criteria. Although the United States exported a wide variety of goods to Cuba during that year, there was noticeable concentration on foodstuffs. The heavy shipments of grain products, the large quantities of wood and paper products, and nonmetallic minerals and metals are not considered suitable for air transportation in the foreseeable future.

Export Commodities

In 1939, exports valued at $0.50 or more per pound considered as air-cargo potentials were valued at $11,934,757, and had an aggregate weight of 12,273,108 pounds; their average value per pound was $0.97.

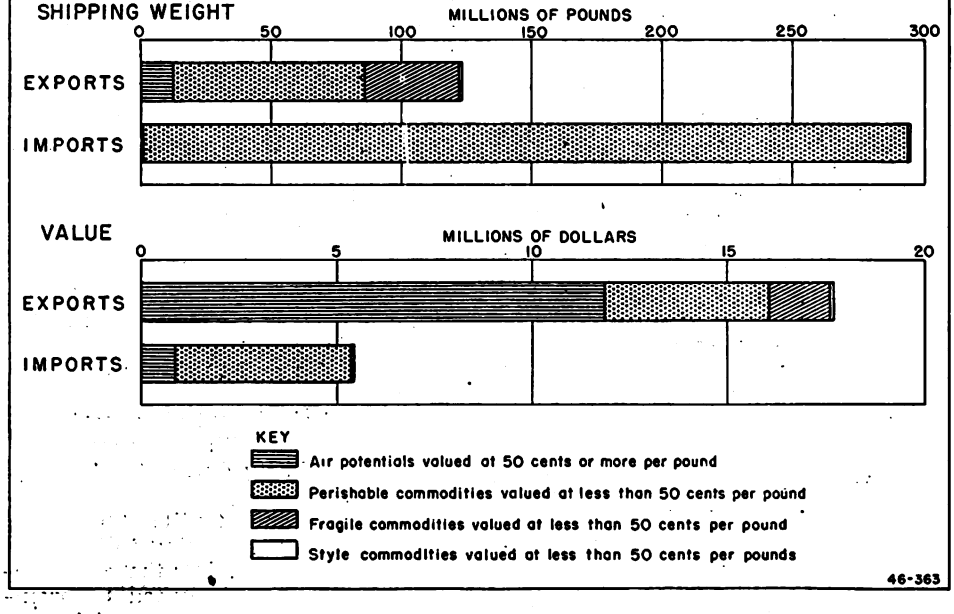
Textiles, leather, tools, machinery and chemicals accounted for considerable quantities of the United States exports to Cuba in the value class of from $0.50 to $0.99 per pound. Commodities ranging from $1 to $2.99 per pound also contributed a considerable value and volume, and were composed principally of the same general types of commodities which were found in the lower price categories. However, quality differences caused them to be classified separately The groups above $3 per pound accounted for a relatively small part of the total weight and value.

Lard, which accounted for 85 percent of the weight of the perishable export commodities, had a per pound value of $0.06 in 1939; therefore, it is unlikely that this commodity will be moved by air in the immediate future. However, it is anticipated that other perishable exports, including biologic and glandular products, some nursery plants, and certain poultry products may well be suited to air shipment.

Approximately one-third of the value of fragile commodities consisted

CHART II

AIR-CARGO POTENTIAL EXPORTS AND IMPORTS IN UNITED STATES TRADE WITH CUBA, 1939 BY CATEGORY OF COMMODITY



46-363

Digitized by Google

of articles worth less than $0.50 per pound. A large portion of this group consisted of beverage containers, glassware, and plate and sheet glass, which are unlikely to move by air in significant quantities in the near future. The portion of this category possessing higher per pound values included radio apparatus and parts, miscellaneous parts of small communication instruments, cameras, watches and scientific instruments.

Twenty of the twenty-four items possessing style and obsolescence characteristcs were evaluated at $0.50 or more per pound. The principal items were women's and children's handbags, bathing suits, dresses, skirts; blouses, and exposed motion picture film.

Import Commodities

Import commodities from Cuba valued at $0.50 or more per pound weighed 504,860 pounds and were valued at $933,891, resulting in an average value of $1.85 per pound.

As may be seen in table 7, the imports valued at $0.50 or more per pound consisted of few items of significant value. Miscellaneous books and pamphlets contributed most of the volume of the $0.50 to $0.99 per pound value class. In the value range from $1 to $1.99 per pound, sponges accounted for more than one-half of the weight. The principal value group in terms of both weight and value was that ranging from $2 to $2.99 per pound. Unstemmed tobacco leaf for cigars accounted for most of the volume and value of that class. Commodities valued at more than $2.99 per pound were insignificant in total value and contained miscellaneous items, including jewelry, perfumes, and films.

The perishable commodities valued at less than $0.50 per pound accounted for more than 99 percent of the volume and 82.7 percent of the value of all import air-cargo potentials. As previously mentioned, much of that weight and value was accounted for by bananas, pineapples, and other fresh fruit and vegetables, all having values of less than $0.50.

Included among the fragile items were building materials which are bulgy and have low per pound values. The volume of commodities with style characteristics was very small, though all the items in that category had values per pound of $0.50 or more. They included women's and misses' leather footwear, handbags, and phonograph records.

Actual Air Shipments

The reader's attention has been called to the fact that the foregoing discussion of air cargo potentials is based on the application to the 1939 foreign trade of certain fixed criteria, and therefore resulted in the inclusion of some commodities which are unsuitable for air shipment. At this point it is of interest to consider data on actual air cargo shipments during 1944 and 1945. The value of these data is lessened to some extent by the fact that they refer to wartime conditions, and the fact that export data were available for only a 3-month period.

Table 2 summarizes by value groups United States air exports to Cuba for May, June, and July 1945 and United States air imports from Cuba from July 1944 through June 1945. Tables 3 and 4 show the leading items in the actual air movement between the United States and Cuba for those periods.

The most significant air export commodities moved with a reasonable degree of regularity during the 3 month period. Apparently medicinals, pharmaceuticals, and textile fibers and manufactures are proving to be satisfactory air exports. For the period indicated, they represented approximately one-fourth of the weight and one-third of the value of the airborne export trade.

The average per-pound value for exports moved by air from the United States to Cuba in May, June, and July 1945 was $4.50.

A number of low-value air import commodities were the result of military requirements. Nickel oxide was imported by air during the war to be used for scientific research. Although this commodity was imported regularly by plane for a number of months, it does not appear to be suited to air transportation under normal conditions. Many of the other imported commodities, however, appear to be well adapted to steady air trade. Articles which were imported by air at least 10 times in the 12 months were: Perfume, cigars and cheroots, hand fans, handbags, belts, leather articles; diamonds, and bracelets.

The average per-pound value for United States air imports from Cuba (July 1944 through June 1945) was $1.50.

TABLE 1.—*Air-Cargo Potentials Between the United States and Cuba in Relation to Total Trade, 1939*

Summary item	Number of commodities	Shipping weight (gross pounds)	Value
United States trade with Cuba; total	1,939	(1)	$181,915,441
United States exports	1,590	(1)	80,829,886
United States imports	349	(1)	101,085,555
Air-cargo potentials; total	629	417,279,639	23,165,070
United States exports	489	122,422,960	17,682,666
United States imports	140	294,856,679	5,482,404
Percentage of total trade represented by air-cargo potentials	32.4	(1)	12.7
United States exports	30.7	(1)	21.9
United States imports	40.1	(1)	5.4

[1] Not available.

SOURCE: Foreign Commerce and Navigation of the United States, calendar year, 1939. U. S. Department of Commerce.

TABLE 2.—*Actual Air Traffic Between the United States and Cuba for Specified Months of 1944 and 1945 by Value Groups*

Value per pound groups	Number of commodities	Shipping weight		Value		Average value per pound
		Gross pounds	Percent of total	Dollars	Percent of total	
U. S. exports—May, June, and July 1945						
Less than $0.50	46	35,690	10.0	$ 5,880	0.4	$ 0.16
0.50 to 0.99	64	33,397	9.4	24,008	1.5	0.72
1.00 to 1.99	103	57,653	16.3	81,457	5.1	1.41
2.00 to 2.99	96	42,871	12.1	109,904	6.9	2.56
3.00 to 3.99	70	48,934	13.8	163,593	10.3	3.34
4.00 to 4.99	45	22,212	6.3	101,201	6.3	4.56
5.00 to 9.99	91	97,171	27.4	687,935	43.1	7.08
10.00 to 24.99	39	13,980	3.9	241,038	15.1	17.24
25.00 and over	18	2,835	.8	180,308	11.3	63.60
Total	572	354,743	100.0	$1,595,324	100.00	$ 4.50
U. S. imports—July 1944 through June 1945						
Less than $0.50	57	518,477	77.9	$ 93,213	9.3	$ 0.18
0.50 to 0.99	34	5,588	.8	4,459	0.4	0.80
1.00 to 1.99	53	11,327	1.7	15,865	1.6	1.40
2.00 to 2.99	36	32,286	4.9	87,103	8.7	2.70
3.00 to 3.99	22	45,300	6.8	166,611	16.7	3.68
4.00 to 4.99	19	11,210	1.7	54,218	5.4	4.84
5.00 to 9.99	39	5,367	.8	35,921	3.6	6.69
10.00 to 24.99	10	30,667	4.6	367,510	36.8	11.98
25.00 and over	18	5,220	.8	174,997	17.5	33.52
Total	288	665,442	100.0	$999,897	100.0	$1.50

SOURCE: United States Exports by Air of Domestic and Foreign Merchandise, May, June, July 1945; and General Imports Into the United States by Air, July 1944–June 1945, U. S. Department of Commerce, Bureau of the Census.

Digitized by Google

Return-Haul Problem

In the summary of potential air cargo between the United States and Cuba, the theoretical export air cargo based on 1939 statistics exceeded the potenital air imports in value by $12,200,262, or more than 220 percent. In terms of weight, however, the unbalance was in the opposite direction, as a result of the inclusion of bulky, low-valued perishables.

Statistics of actual United States air-cargo trade with Cuba show that, for the periods covered, the volume and value of exports were considerably greater than those of imports. If both series were adjusted to a comparable time period, air exports would exceed imports by more than 2 times in weight and by 6⅓ times in value. Furthermore, if nickel oxide, which represented a wartime shipment, were removed from the list of imports, exports would exceed imports by 8⅓ times in terms of weight and by 7 times in value. As the foregoing figures represent only a short period of time and business done under abnormal conditions, they should not be considered as a clear indication of future possibilities. However, they do show that air trade with Cuba will tend to be unbalanced, with United States exports predominating.

Actual air shipments from Cuba of many low-priced items probably will decrease as soon as peacetime production allows them to be shipped regularly and in normal quantities. To some extent, these declines in air trade may be counteracted by the United States demand for more consumer goods in all value classes. These items include jewelry, perfume, shoes, cigars, and miscellaneous articles of apparel. As the air-cargo business offers greater transportation advantages, it may intensify United States markets for some airborne products and develop new markets for other products. While any developments in the above direction may somewhat reduce the unbalance between air exports and imports, it is unlikely that they will remove it completely in the near future. Therefore, airlines will probably have to be prepared to cope with a return-haul problem for some time.

Air transportation between Cuba and the United States was firmly established during the war. In recent years Cuba has shown interest in improving its airport facilities and has expanded its air services to help take care of increased demands for passenger, mail, and air express services. The short distance between the countries may be a favorable factor in developing air-cargo trade since the total charges for shipment would be low enough to permit the movement of many fairly low valued commodities. In summary, future air-cargo business between the United States and Cuba will probably have a return-haul problem, but it also will have the advantages of an established foothold and of short-haul charges.

TABLE 3.—*Principal United States Air Exports to Cuba May, June, and July 1945* [1]

[Arranged in descending order of weight]

Commodity	Shipping weight (gross pounds)	Value (dollars)	Value per pound
Aviation motor fuels	19,865	$310	$0.02
Medicinal chemicals for prescription use	16,199	130,563	8.06
General merchandise valued at $10 or less	13,406	8,926	0.67
Women's and children's handbags, purses, and pocketbooks of materials other than leather	10,792	35,457	3.29
Automobile parts for replacement	9,435	11,522	1.22
Miscellaneous druggists' rubber sundries, except surgeons and household gloves	9,338	24,016	2.57
Vitamins and vitasterols	8,328	68,774	8.26
Notions, novelties, and specialties	8,095	21,760	2.69
Live poultry	7,720	11,247	1.46
Motion picture films, exposed or developed, 35 mm., 4,000 linear feet or over	6,479	20,807	3.21
Women's jewelry	6,382	41,321	6.47
Civil airplanes	6,066	30,000	4.95
Women's and children's dresses and ensembles, except knit or crocheted	6,001	42,572	7.09
Parts and accessories for tractors	5,960	6,031	1.01
Lithographically printed matter	5,788	4,643	0.80
Periodicals	5,749	2,139	0.37
Serums, antitoxins, and toxoids, for human use	5,395	36,926	6.84
Corsets, brassieres, and girdles, other than those of rubber or rubberized material	5,297	27,476	5.19
Glandular products, organotherapeutics, enzymes, ferments, and culture media	4,461	40,660	9.11
Fur wearing apparel	2,932	34,159	11.65
Spectacles, eyeglasses, goggles, lenses, and frames	2,710	54,683	20.18
Teeth	2,488	51,630	20.75
Women's jewelry	1,691	42,077	24.88
Jewelry findings and parts	926	27,892	30.12
Fountain and stylographic pens of plastic	542	36,036	66.49
Precious metals for dentistry, except silver alloys and amalgrams	359	62,890	175.18

[1] Commodities with a total shipping weight of at least 5,000 pounds or a total value of at least $25,000 have been included.

SOURCE: United States Exports by Air of Domestic and Foreign Merchandise, May, June and July 1945, U. S Department of Commerce, Bureau of the Census.

TABLE 4.—*Principal United States Air Imports from Cuba July 1944–June 1945* [1]

[Arranged in descending order of weight]

Commodity	Shipping weight (gross pounds)	Value (dollars)	Value per pound
Nickel oxide	494,845	$ 90,202	$0.18
Cigars and cheroots	44,760	164,878	3.68
Miscellaneous articles	26,999	73,030	2.70
Women's and children's handbags principally of reptile leather	20,524	231,886	11.30
Brewers yeast other than alcoholic and non-alcoholic	15,064	1,903	0.12
Perfumery and cologne containing alcohol	5,425	27,022	4.98
Hand fans of all kinds, except undecorated and unornamented palm leaf fans	4,905	23,172	4.72
Household furniture, wearing apparel, tools of trade, books and professional and personal effects, not merchandise	3,777	4,953	1.31
Sponges, sheepswool	3,145	33,870	10.77
Frog legs	2,613	2,058	0.79
Caffeine	2,557	28,557	11.17
Men's welt boots and shoes	2,326	6,710	2.88
Manufactures of wood and bark	1,842	2,892	1.57
Jewelry, other than bracelets, broaches, and clips between 20 cents and $5 per dozen	1,578	57,924	36.71
Stamps, foreign, postage or revenue and foreign governments stamped envelopes or post cards which bear only the official imprint	1,411	15,019	10.64
Manufactures of bone, hoofs and horns	1,365	1,848	1.35
Embroidered leather articles wholly or chiefly of reptile leather	1,257	28,437	22.62
Cigarettes	1,136	1,362	1.20
Yellow and grass sponges	1,013	5,813	5.74
Belts and buckles designed to be worn on the person wholly or chiefly of reptile leather	660	5,989	9.07
Jewelry of metal other than gold or platinum	484	8,377	17.31
Bracelets, not over $5 per dozen pieces	353	8,015	22.71
Bracelets, valued over $5 per dozen pieces	272	10,161	37.37
Other metal jewelry	199	9,420	47.34
Diamonds, cut or unset	19	86,519	4,553.63

[1] Commodities with a total shipping weight of at least 1,000 pounds or a total value of at least $5,000 have been included.

SOURCE: General Imports into the United States by Air, July 1944–June 1945, U. S. Department of Commerce, Bureau of the Census.

Data Included in Tables

Tables 5 to 10, inclusive give details of the air-cargo potentials itemized and grouped for convenience of reference. Table 5 summarizes, by value groups, items valued at $0.50 and more a pound. Table 6 lists perishables, fragile commodities, and those possessing a style factor. These categories have no lower limit as to value per pound. Tables 7 through 10 contain itemized lists of the commodities summarized in tables 5 and 6, giving their weight, value per pound, and density.

Digitized by Google

TABLE 5.—*Summary of Commodities Valued at $0.50 or More Per Pound in United States Trade with Cuba, 1939*

Item	Commodities			Shipping weight		Value		
	Number	Percent of air-cargo potentials	Percent of total trade	Gross pounds	Percent of air-cargo potentials	Dollars	Percent of air-cargo potentials	Percent of total trade
Exports:								
Group, value per pound:								
1.....$ 0.50 to $ 0.99	194	39.7	12.2	9,000,422	7.4	6,932,468	39.2	8.6
2..... 1.00 to 1.99	115	23.5	7.2	2,698,844	2.2	3,267,480	18.5	4.0
3..... 2.00 to 2.99	44	9.0	.6	399,918	.3	954,571	5.4	1.2
4..... 3.00 to 3.99	23	4.7	2.8	110,143	.1	361,407	2.0	.4
5..... 4.00 to 4.99	10	2.0	1.4	23,276	(1)	108,400	.6	.1
6..... 5.00 to 9.99	17	3.5	1.1	38,223	(1)	263,167	1.5	.3
7..... 10.00 to 24.99	6	1.2	.4	2,097	(1)	37,358	.2	(1)
8..... 25.00 and over	5	1.0	.3	185	(1)	9,906	.1	(1)
Total $0.50 or over	414	84.6	26.0	12,273,108	10.0	11,934,757	67.5	14.6
Total air-cargo potentials [2]	489	100.0	30.8	122,422,960	100.0	17,682,666	100.0	21.9
Total exports to Cuba	1,590		100.0	(3)		80,829,886		100.0
Imports:								
Group, value per pound:								
1.....$ 0.50 to $ 0.99	33	23.6	9.5	132,910	(1)	80,566	1.4	.1
2..... 1.00 to 1.99	31	22.1	8.9	175,876	.1	294,051	5.4	.3
3..... 2.00 to 2.99	7	5.0	2.0	194,768	.1	547,262	10.0	.5
4..... 3.00 to 3.99	4	2.9	1.1	88	(1)	312	(1)	(1)
5..... 4.00 to 4.99	4	2.9	1.1	190	(1)	893	(1)	(1)
6..... 5.00 to 9.99	6	4.3	1.7	674	(1)	5,769	.1	(1)
7..... 10.00 to 24.99	7	5.0	2.0	347	(1)	4,751	.1	(1)
8..... 25.00 and over	1	.7	.3	7	(1)	287	(1)	(1)
Total $0.50 or over	93	66.5	26.6	504,860	.2	933,891	17.0	.9
Total air-cargo potentials [2]	140	100.0	40.1	294,856,679	100.0	5,482,404	100.0	5.4
Total imports from Cuba	349		100.0	(3)		101,085,555		100.0

[1] Less than 0.05 percent.

[2] Includes, in addition to commodities valued $0.50 per pound and over, those commodities valued less than $0.50, selected because of perishability, fragility, or as possessing a style factor. A commodity which appears under more than one category is accounted for only once in arriving at the total.

[3] Not available.

SOURCE: Foreign Commerce and Navigation of the United States, Calendar Year 1939, U. S. Department of Commerce.

TABLE 6.—*Summary of Commodities Possessing Perishability, Fragility, or Style Factor in United States Trade with Cuba, 1939*

Categories	Commodities			Shipping weight		Value		
	Number	Percent of air-cargo potentials [1]	Percent of total trade	Gross pounds	Percent of air-cargo potentials [1]	Dollars	Percent of air-cargo potentials [1]	Percent of total trade
Exports, value per pound:								
Perishable commodities:								
Less than $0.50	40	8.2	2.5	73,599,189	60.1	4,156,521	23.5	5.1
$0.50 or more	8	1.8	.6	215,700	.2	312,353	1.8	.4
Total	48	10.0	3.1	73,814,889	60.3	4,468,874	25.3	5.5
Fragile commodities:								
Less than $0.50	34	6.9	2.1	36,481,751	29.8	1,569,134	8.9	1.9
$0.50 or more	62	12.7	3.9	1,356,770	1.1	1,489,812	8.4	1.8
Total	96	19.6	6.0	37,838,521	30.9	3,058,946	17.3	3.7
Commodities possessing style factor:								
Less than $0.50	4	.8	.3	169,748	.1	55,508	.3	.1
$0.50 or more	20	4.1	1.2	309,285	.3	491,229	2.8	.6
Total	24	4.9	1.5	479,033	.4	546,737	3.1	.7
Imports, value per pound:								
Perishable commodities:								
Less than $0.50	32	22.9	9.2	294,139,453	99.7	4,533,127	82.7	4.5
$0.50 or more	4	2.9	1.1	694	(2)	985	(2)	(2)
Total	36	25.8	10.3	294,140,147	99.7	4,534,112	82.7	4.5
Fragile commodities:								
Less than $0.50	15	10.7	4.3	212,366	.1	15,386	.3	(2)
$0.50 or more	6	4.3	1.7	229	(2)	1,251	(2)	(2)
Total	21	15.0	6.0	212,595	.1	16,637	.3	(2)
Commodities possessing style factor:								
Less than $0.50								
$0.50 or more	5	3.6	1.4	865	(2)	1,662	(2)	(2)
Total	5	3.6	1.4	865	(2)	1,662	(2)	(2)

[1] See table 1 for figures on total air-cargo potentials.

[2] Less than 0.05 percent.

SOURCE: Foreign Commerce and Navigation of the United States, Calendar Year 1939, U. S. Department of Commerce.

Digitized by Google

TABLE 7.—*Commodities Valued at $0.50 or More Per Pound in United States Trade With Cuba, 1939*

[Group 1—Commodities valued from $0.50 to $0.99 per pound]

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	EXPORTS				
	Animals edible:				
0012	Other cattle	3,504	$2,000	$0.57	(1)
0019	Poultry, live	3,097	2,222	.72	(1)
	Meat products:				
0049	Sausage casings, other	18,769	16,667	.89	av. 52
0099	Other edible animal products [2]	38,035	19,778	.52	(1)
	Upper leather, except patent:				
0300	Cattle side, grain black	55,941	38,609	.69	av. 18
0301	Cattle side, grain other	506,308	287,707	.57	av. 21
0305	Calf and kip, other	233,915	194,141	.83	av. 18
0307	Sheep and lamb	134,234	84,826	.63	av. 21
0311	Upper leather, other [2]	24,572	12,804	.52	av. 21
0312.3	Patent upper leather, whole calf and kip	810	784	.97	10
0321	Lining leather, sheep and lamb	125,394	92,280	.74	31
0323	Other lining leather	10,189	9,387	.92	31
0324	Sole leather, bends and sides	10,324	5,418	.52	34–53
0328	Boot and shoe cut stock, other cut stock	10,290	5,248	.51	18–30
0330	Belting leather	4,317	3,549	.82	43
	Glove and garment leather:				
0336	Sheep and lamb	23,958	21,045	.88	19
0339	Other glove and garment leather	13,643	8,624	.63	19
0600	Leather Welting	31,317	19,417	.62	17
	Boots, shoes, and other footwear with leather uppers:				
0645	Men's boots and shoes	190,289	187,730	.99	14
0646	Youths' and boys' boots and shoes	18,915	17,071	.90	av. 12
0650	Slippers for housewear, all leather	4,189	3,297	.79	9
0656	Boots, shoes, and other footwear, with uppers of material other than leather	18,811	9,979	.53	av. 12
0659	Discontinued models, old styles, second-hand shoes	54,900	34,587	.63	av. 12
0689	Women's and children's handbags, pocketbooks and purses of other materials	153,215	105,143	.69	5–9
0697	Belts to be worn on the person	28,000	24,360	.87	8
0699	Other leather manufactures	49,938	44,445	.89	(1)
0900	Horses for breeding	779	500	.64	(1)
0923	Feathers crude, not dressed	439	434	.99	av. 11
2042	Druggists' rubber sundries, other	50,712	43,105	.85	13
2046	Rubber toys and balls	29,685	21,670	.73	18
2049	Rubber erasers	7,209	3,670	.51	26
2096	Gutta-percha manufactures	1,097	770	.70	(1)
2279	Other natural essential and distilled oils	50,465	47,468	.94	21–42
	Field and garden seed:				
2467	Flower seeds	4,157	4,110	.99	27
2468	Vegetable seeds	42,789	35,762	.84	10–36
2599	All other nursery and greenhouse stock	4,388	3,510	.80	16
2611	Cigar leaf tobacco	835	588	.70	20–21
	Tobacco manufactures:				
2622	Cigarettes	217,571	155,841	.72	22
2623	Chewing tobacco, plug and other	1,773	1,009	.57	51
2629	Other tobacco manufactures	4	3	.75	25
3015	Cotton sewing thread	133,755	85,356	.64	21–34
3016	Crochet, darning, and embroidery cotton	16,694	8,729	.52	11
	Cotton print cloth yarn fabrics:				
3049.2	Carded broad cloth, printed	54,520	27,778	.51	20–25
3050	Cheesecloth and gauze, bleached or dyed (full pieces)	28,631	21,544	.75	17
	Fine goods and combed cotton fabrics:				
3067	Voiles, organdies, lawns, and batiste, combed	207,010	133,238	.64	av. 10
	Other cotton fabrics:				
3084	Tapestries and other upholstery goods	12,161	7,453	.61	13–21
3087	Plushes	1,359	1,111	.82	av. 15
3088	Other pile fabrics	8,765	7,584	.87	10–21
3096	Underwear, men's and boys'	11,513	9,279	.81	av. 12
3099.1	Men's and boys' sweaters, jersey pull-overs and sweat shirts	3,512	3,124	.89	av. 7
3099.9	Other knit outerwear [2]	5,272	4,532	.86	7–22
	Other cotton wearing apparel:				
3114	Overalls, breeches, pants, aprons and men's work clothing [2]	5,870	5,356	.91	25
3116.1	Underwear men's athletic, not knit	14,410	12,531	.87	13
3117.1	Work shirts	630	530	.84	10
3127	Children's outerwear, not knit	11,676	7,508	.64	6–22
3140	Cotton woven belting for machinery	7,346	7,205	.98	37
3160	Cotton braids, trimmings, bindings, lacings, tape, labels, and webbing	47,436	40,795	.86	15
3161	Other narrow fabrics [2]	19,984	10,991	.55	15
3173	Cotton quilts, comfortables and quilted bedpads	166	111	.67	av. 13
3175	Cotton bedspreads, candlewick, chenille and tufted	5,923	4,778	.81	av. 14
3181	Cotton curtains and draperies	879	615	.70	8
3189	Other housefurnishings [2]	9,729	5,448	.56	(1)
3399	Flax, hemp, and ramie manufactures	8,333	8,000	.96	(1)
3609	Wool, mohair and angora rabbit hair, unmanufactured	151	132	.87	(1)
3649	Other wool fabrics	8,423	6,653	.79	16
3690.9	Hair unmanufactured, cattle and ox hair, other	102	60	.59	11–16
3699	Other hair manufactures	4,082	2,082	.51	(1)
	Rayon and other synthetic textiles:				
3845	Piece goods wholly or chiefly rayon and other synthetic fibers, pile (velvets etc.)	77,464	74,367	.96	2
3848	Piece goods wholly or chiefly rayon and other synthetic fibers, knit fabric in the piece	32,507	26,499	.82	4
3849.1	Piece goods wholly or chiefly rayon and other synthetic fibers, other woven fabric	3,269,416	$2,844,959	$0.87	31
3850	Rayon house furnishings	2,385	2,123	.89	(1)
3854	Hosiery, women's and children's	6,884	5,976	.87	av. 13
3858.5	Braids fringes and narrow trimmings	16,856	15,002	.89	12
3928	Neckties, cravats, mufflers, scarves of all fibers	4,172	3,692	.88	av. 22
3940	Hat braids, strips and sheets of natural fibers or synthetic textiles	5,967	4,177	.70	14
	Hats and hat bodies of straw, palm leaf, etc.:				
3944	Other sewed	5,331	4,620	.87	3–10
3957	Other hats, caps and berets, knit	810	529	.65	10–15
5474	Carbon and graphite products, brushes and stock	16,322	8,161	.50	30
	Cutlery:				
6112	Razors, safety	12,958	6,552	.51	38
6114	Scissors, shears, and snips	5,107	3,305	.65	44
6115	Table cutlery including forks	47,507	30,239	.64	30
6150	Domestic oil burners	2,639	2,226	.84	6
	Tools:				
6156	Crosscut, hand, back, and other saws [2]	10,437	6,262	.60	21–30
6169	Hand operated pipe stocks and dies, die stocks, dies and bushings	4,088	2,984	.73	53–120
6170	Hand operated pipe cutters and other metal cutting tools [2]	1,619	907	.56	53–120
6172	Slip joint pliers	441	341	.77	50–90
6173	Other pliers, pincers, nippers, and splicing clamps	1,795	1,271	.71	50–90
6178.9	Other hand tools and parts	85,552	84,699	.99	20–41
6469	Other hardware of brass or bronze	22,088	12,369	.56	10–90
6958	Silverplated ware, knives, forks, and steak sets	14,092	10,710	.76	17–43
6959	Silverplated ware, other	25,886	20,968	.81	17–43
7000	Direct current generators	12,304	6,521	.53	51
7011	Self contained lighting outfits	66,933	34,136	.51	(1)
7019	Capacitors ½ kilovolt ampere and larger	20	13	.65	120–160
	Transforming and converting apparatus:				
7027.1	Rotating converting apparatus under 300 pounds	6,903	4,694	.68	51
7028	Complete battery chargers, nonrotating	13,120	7,085	.54	15–26
	Transmission and distribution apparatus:				
7030	Feeder voltage regulators	3,227	2,065	.64	100–140
7031	Switchboard panels except telephone	26,277	13,927	.53	4–24
7034	Fuses	15,931	10,674	.67	22
7035	Watt-hour and other measuring meters	55,595	47,256	.85	37–64
	Motors, starters, controllers:				
7048	Starting and controlling equipment for industrial motors and parts	27,642	13,821	.50	(1)
7049	Starting and controlling equipment for electric railway and vehicle motors and parts	4,050	2,187	.54	(1)
7056	Portable electric tools	10,145	7,000	.69	24–140
7060	Electric appliances: Flashlight cases	20,738	11,406	.55	10
7064	Electric incandescent lamps: Other metal filament lamps	276,721	185,403	.67	5–12
7065	Other electric lamps	11,530	5,765	.50	4–12
7066	Searchlights and airport beacons	879	554	.63	8–15
7069.1	Electric domestic vacuum cleaners	960	509	.53	8–33
7069.3	Electric domestic vacuum cleaner parts	14	8	.57	8–33
7073.5	Other domestic electric utensils	23,459	11,964	.51	6–11
7075.5	Other X-ray apparatus and parts	48,232	38,103	.79	14–60
7089	Bells, buzzers, annunciators, and alarms	4,599	4,277	.93	24
	Other electrical apparatus:				
7095	Sockets, outlets, fuse blocks, lighting switches and parts	44,683	36,640	.82	20
7097	Electric exterior lighting fixtures and parts	9,919	5,356	.54	(1)
	Internal combustion engines:				
7142	Stationary and portable engines Diesel and semi-Diesel	74,027	40,715	.55	av. 95
7311	Rock drills	7,514	4,959	.66	16–157
	Power-driven metal-working machinery:				
7406	Thread-cutting and automatic screw machines	191	105	.55	26–35
7407	Knee and column type milling machines	12,563	6,784	.54	47
7442	Tool grinding, cutter grinding, and universal grinding machines	3,026	1,513	.50	31–40
7443	Other metal grinding machines and parts	2,134	1,622	.76	31–49
7455	Other power-driven metal working machinery and parts	14,851	7,871	.53	18–49
7458	Other portable and hand and foot operated metal working machines and parts	28,305	16,700	.59	15–69
7471	Chucks for machine tools	2,454	2,258	.92	42–78
	Textile machinery:				
7502	Other circular knitting machines	7,046	5,355	.76	18–28
7504	Other knitting machines and parts	69,926	63,633	.91	15–46

See footnotes at end of table.

Digitized by Google

TABLE 7.—*Commodities Valued at $0.50 or More Per Pound in United States Trade With Cuba, 1939*—Continued

[Group 1—Commodities valued from $0.50 to $0.99 per pound]

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	EXPORTS—Continued				
7552	Sewing machines for factory or industrial use	122,101	$73,261	$0.60	5–37
7590	Cigarette and cigar making and other tobacco machinery and parts	33,935	18,664	.55	(1)
7691	Ball bearings and parts except balls	17,060	13,307	.78	50–120
7692	Roller bearings and parts except rollers	11,412	8,787	.77	50–120
7760	Accounting and calculating machines, other, including used and rebuilt	2,671	2,644	.99	13–28
7763	Duplicating machines, parts and supplies for	19,014	10,838	.57	13–20
7767	Cash registers, parts	3,843	3,766	.98	23
	Typewriters:				
7770	New Standard	75,014	62,262	.83	19
7772	Portable new	23,193	19,018	.82	24
7774.1	Rebuilt	21,941	12,287	.56	20
7774.9	Other, used	12,963	8,167	.63	20
	Printing and bookbinding machinery:				
7790	Typesetting machines	3,713	2,265	.61	av. 23
7795	Other machinery, parts and accessories	62,309	40,501	.65	23–55
7802	Other dairy equipment and parts for farm use	9,994	6,396	.64	10–22
7916	Automotive piston rings	13,116	10,755	.82	24
7921	Spark plugs	29,024	26,702	.92	av. 49
7954	Motorcycle parts and accessories (except tires)	2,198	1,395	.63	(1)
7958	Internal combustion engines—Diesel and semi-Diesel	24,106	20,972	.87	20–47
7970	Railway signals, attachments and parts	912	520	.57	(1)
8120	Biologics for animal and veterinary use	136,688	120,286	.88	(1)
8130	Medicinal and reagent chemicals	49,619	36,718	.74	23
	Proprietary medicinal preparations:				
8149	Corn and foot remedies	5,287	4,177	.79	14
8152	Salves and ointments for burns, cuts, skin diseases, insect bites, inflammation, etc	51,693	34,634	.67	33
8180	Other proprietary medicinal preparations	125,791	72,959	.58	30–45
8200	Nicotine sulphate (40% basis)	4,090	2,337	.57	34
8264	Pyroxylin, sheets, rods or tubes and other unfinished forms	9,469	5,470	.58	10–68
8265	Cellulose, acetate sheets, rods or tubes and other unfinished forms	2,722	2,044	.75	(1)
8296	Pectin	399	343	.86	28–52
8301	Acetic anhydrides	10	5	.50	24–43
8601	Explosives, smokeless powder	6,432	4,765	.74	53
8735	Other dentrifices	2,253	1,441	.64	23
8742	Face and compact powder	21,705	12,589	.58	19–50
8751	Vanishing creams	1,322	807	.61	30
8757	Other cosmetics	15,892	11,760	.74	av. 30
8766	Perfumery and toilet water	2,825	2,740	.97	25
9003	Cameras other than motion-picture box type (set focus)	6,512	5,028	.77	17–40
9008.1	Motion-picture projectors, substandard gauge (less than 35 mm.), silent	4,600	3,562	.77	20–28
9011	Motion picture reproducing sound equipment	23,070	21,686	.94	av. 11
9115	Motion picture films, sensitized, not exposed, positive film, one inch or more in width	11,152	10,896	.98	av. 40
9125	Other sensitized films, not exposed, cartridge or rolls	56,524	41,045	.73	26
9140	Other photographic apparatus and supplies	34,517	26,578	.77	av. 27
7155	Other dental equipment and supplies	88,168	55,546	.63	8–62
9156	Sterilizers	4,937	2,946	.60	6–21
9232	Other organs	234	141	.60	(1)
9245	Percussion band instruments	1,638	1,523	.93	2–14
9295	Other musical instruments	75	74	.99	2–27
9297	Musical instruments, parts and accessories [2]	19,233	10,386	.54	8–18
9319	Other penholders and parts	1,923	1,019	.53	8–42
	Athletic and sporting goods:				
9422	Other fishing tackle and parts	4,738	3,411	.72	av. 30
9434	Foot, basket, base, tennis and other balls	16,216	15,081	.93	(1)
	Firearms and ordnance:				
9472	Rifles	4,436	2,549	.57	26–39
9473	Shotguns	11,281	6,689	.59	av. 29
	Ammunition:				
9490	Shot shells	37,975	27,260	.72	76
9491	Metallic cartridges	84,510	83,849	.99	130
9565	Playing cards	20,050	13,891	.69	48
	Clocks:				
9570	Electric	15,646	8,472	.54	16
9571	One-day alarm clocks, except electric [2]	61,211	53,574	$0.88	26–40
9591	Time recording devices and parts	3,778	2,947	.78	(1)
9793	Gasoline pressure lamps, lanterns and parts	2,161	1,210	.56	3–22
	Synthetic resin products:				
9810	Laminated sheets, plates, rods, tubes and other unfinished forms	3,846	2,064	.54	(1)
9812	Molded products	963	623	.65	(1)
9813	Other synthetic resin products	7,116	3,742	.53	(1)
9819	Manufactures of cellulose, acetate [2]	3,910	2,659	.68	(1)
9820	Manufactures of all other compounds of cellulose [2]	23,617	17,713	.75	(1)
9824	Toilet brushes, other than tooth-brushes	11,751	7,237	.62	5–16
9826.9	Other brushes including industrial	11,563	11,306	.98	29
9828	Tobacco pipes of all materials	2,124	1,946	.92	13
9831	Umbrellas and parasols	3,361	2,333	.69	av. 24
9870	Coin operated phonographs	107,520	62,002	.58	17–24
	Total	9,000,422	$6,932,468	$0.77	.....
	IMPORTS				
0034.0	Sheep, lamb and goat sausage casings	31	$30	$0.97	av. 53
	Leather footwear, boots, and shoes:				
0350.9	Other men's leather footwear, boots and shoes [2]	1,044	929	.89	av. 14
0352.9	Other women's and misses' shoes	745	447	.60	12–14
0699.9	Manufactures of leather, rawhide, or parchment	172	115	.67	(1)
0862.3	Songbirds valued at $5 or less each	370	300	.81	(1)
0895.0	Game animals and birds for stocking purposes	71	40	.56	(1)
0970.3	Hardhead or reef sponges	4,227	3,063	.72	2–13
0970.5	Other sponges	2,162	1,585	.73	2–13
1380.05	Almond paste	63	35	.56	(1)
2032.0	Rubber footwear with fabric uppers	29	28	.97	12–22
2098.4	Rubber heels and soles	390	245	.63	45
2629.9	Manufactures of tobacco [3]	256	129	.50	22–31
3610.3	Blankets not over 3 yards in length valued at not more than $1 per pound	40	36	.90	10–30
3680.8	Manufactures of wool [2]	21	16	.76	10–30
4280.41	Picture and mirror frames	65	47	.72	(1)
4785.30	Boxes of paper, papier mache or wood covered or lined with cotton or vegetable fiber	941	498	.53	3–8
4790.02	Bags and articles of surface-coated parchment or similar papers	21	17	.81	19–26
5350.2	Table and kitchen articles and utensils, domestic and household ware, decorated and colored	64	39	.61	(1)
5373.7	Earthenware and stoneware and mfgs. [3]	10	8	.80	15–19
6790.29	Lighting articles, not plated with platinum and candlestick lamps	88	63	.72	(1)
8070.9	Acetanilide medicinal acetiphenetidine and acetylsalicylic acid	66	46	.70	27–44
8725.40	Toilet waters containing alcohol	19	18	.95	15–33
9500.00	Books and pamphlets printed wholly or chiefly in languages other than English	82,217	43,575	.53	28
9501.00	Books, maps, music engravings, photographs, etchings, and lithographic prints and charts	16,922	13,030	.77	(1)
9503.20	Books, maps, music, engraving, prints, photographs, charts and etchings for education and religious purposes, not for sale	13	12	.92	(1)
9510.04	Printed matter (other than lithographic) composed of surface coated and other papers [3]	1,027	600	.58	30–40
9510.52	Other books [3], not of bona fide foreign authorship	80	41	.51	28
9510.57	Tourist literature including maps, charts, etc	34	18	.53	(1)
9521.10	Labels and flags [2]	21,446	15,373	.72	36–53
9521–30	Cigar bands	103	58	.56	(1)
9640.00	Artistic antiques, works of art and furniture	82	60	.73	(1)
9800.99	Other smokers articles	77	54	70	3–24
9850.25	Hand fans of all kinds except undecorated or unornamental palm leaf fans	14	11	.79	(1)
	Total	132,910	$80,566	$0.61	.....

[Group 2—Commodities valued from $1.00 to $1.99 per pound]

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	EXPORTS				
	Upper leather (except patent):				
0304	Calf and kip, black	28,247	$52,954	$1.87	av. 18
	Goat and kid:				
0308	Glazed, black	25,912	41,649	1.61	av. 21
0309	Glazed, other	119,704	143,703	1.20	av. 21
0310	Horse and colt	10,618	16,279	1.53	av. 21
0312.1	Patent upper leather, cattle	142,397	146,351	1.03	10
0338	Glove and garment leather, pig and hog	1,439	2,148	1.49	19–20
0353	Upholstery and automobile leather	855	1,443	1.69	24
0356	Case, bag, and strap leather	23,669	23,928	1.01	18–30
0357	Reptilian and aquatic leather for all purposes	3,249	$4,234	$1.30	18–30
	Boots, shoes and other footwear with leather uppers:				
0647	Women's and misses boots and shoes	220,794	270,655	1.23	11
0648	Infants' and children's boots and shoes	36,254	41,325	1.14	9
0672	Leather gloves and mittens	2,486	3,573	1.44	12–28
0680	Leather belting, new	40,967	46,874	1.14	37

See footnotes at end of table.

Digitized by Google

TABLE 7.—*Commodities Valued at $0.50 or More Per Pound in United States Trade With Cuba, 1939*—Continued

[Group 2—Commodities valued from $1.00 to $1.99 per pound]

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	EXPORTS—Continued				
0688	Women's and children's handbags, pocketbooks and purses, leather	16,042	$20,872	$1.30	5–9
	Card cases, change purses, wallets and similar articles:				
0692	Leather	3,343	3,838	1.15	9
0693	Other materials	1,495	2,739	1.83	9
0698.9	Leather wearing apparel	2,041	3,163	1.55	8
0929	Feathers dressed and manufactures of feathers	3,138	3,389	1.08	6–29
2039	Rubber gloves and mittens	8,266	9,841	1.19	12
2047	Bathing caps	1,651	2,045	1.24	8
2058	Hard rubber goods, combs finished	10,656	10,818	1.02	24
2095	Rubber thread	9,870	10,751	1.09	34
2271	Essential or distilled oils, citrus oils	1,654	2,845	1.72	21–42
2280	Blended, compounded, or mixed perfume flavor oils	93,318	119,032	1.28	24
3090	Cotton wearing apparel, handkerchiefs	43,680	44,503	1.02	av. 15
	Hosiery:				
3093	Women's	7,623	10,496	1.38	av. 18
3094	Children's	12,335	16,717	1.36	av. 13
3095	Men's	6,108	9,944	1.63	av. 15
3097	Underwear, women's and children's	2,051	4,033	1.97	11
3098	Nightwear, women's and children's	155	157	1.01	av. 7
3099.5	Women's and children's sweaters, shawls and mufflers	904	1,172	1.30	av. 7
	Other cotton wearing apparel:				
3113	Men's and boys' jackets and windbreakers, corduroy, moleskin, leatherette, and sheep lined	48	89	1.85	av. 25
3115	Nightwear, men's	536	762	1.42	av. 7
3117.2	Other men's and boys' shirts (except knit)	27,179	45,447	1.67	10
3122	Women's dresses and ensembles	18,030	24,616	1.37	av. 11
3124	Women's and children's underwear and nightwear, not knit	3,599	5,418	1.51	13
3129	Other women's and children's apparel of woven fabrics[2]	11,154	13,608	1.22	6–22
3633	Wool yarns	2,936	4,023	1.37	13
3642	Wool cloth and dress yarns	57,875	66,837	1.15	12–16
3643	Mohair cloth	52,908	64,980	1.23	12
3662	Carpets and rugs of wool	7,684	8,524	1.11	av. 13
	Wool wearing apparel:				
3679	Other knit goods	42,731	45,295	1.06	av. 10
3681	Women's and children's wool clothing	3,538	5,704	1.61	16
3689	Other wool or mohair manufactures	10,410	11,035	1.06	(1)
	Fabrics wholly or chiefly of silk:				
3720	Broad silks	14,694	21,616	1.47	22
3725	Velvets, plushes and chenilles	1,345	1,458	1.08	10–21
	Silk wearing apparel:				
3741	Underwear	1,103	1,282	1.16	8–16
3757	Hosiery, men's socks	6,922	9,905	1.43	12
	Rayon and other synthetic textiles:				
3856	Hosiery, men's socks	1,883	2,869	1.52	av. 13
3856.1	Knit underwear	13,088	16,030	1.22	av. 10
3857.2	Woven underwear	10,089	15,822	1.57	av. 12
3858.1	Ribbons	22,955	33,056	1.44	12
3859	Other synthetic textile manufactures	30,494	35,983	1.18	(1)
3913	Windowshade cloth	2,015	2,100	1.04	52
3918	Waterproof outer garments	1,159	1,369	1.18	av. 12
3945	Other woven hats and hat bodies of straw, palm leaf, etc	2,846	3,045	1.07	3–10
3952	Women's and girls' fur-felt hats	858	935	1.09	3–6
2953	Wool felt hats	2,196	2,926	1.33	3–10
3963	Artificial or ornamental flowers, fruits, vegetables, etc	10,714	11,357	1.06	3–6
3994	Garters, arm bands, suspenders	17,795	18,685	1.05	av. 17
5217	Laminated glass and manufactures	1,634	1,994	1.22	14–80
5990	Precious synthetic and imitation stones, including pearls	36	61	1.70	(1)
6118	Cutlery, machine knives	2,630	3,248	1.23	(1)
	Tools:				
6155.1	Circular saws	3,187	4,313	1.35	34
6157.1	Augers, bits, gimlets, gimlet bits and counter sinks, woodworking	10,380	11,022	1.06	40–100
6167	Drills, reamers and counter sinks, metal cutting	7,542	13,048	1.73	30–65
6181	Cabinet and other locks of iron, steel and bronze	9,363	13,470	1.44	21
6630	Nickel chrome electric resistance wire	207	228	1.10	50
6635	Quicksilver or mercury	595	963	1.62	172–180
7026	Mercury power rectifiers	579	602	1.04	5–12
	Transmission and distribution apparatus:				
7036	Electrical indicating instruments	4,806	8,602	1.79	5–17
7038	Other electrical testing apparatus and parts	15,405	15,559	1.01	(1)
	Electrical appliances:				
7063	Electric incandescent lamps for automobiles, flashlights, and Christmas trees	16,751	21,776	1.30	5–12
7075.9	Other therapeutic apparatus and parts	8,023	8,906	1.11	(1)
	Radio Apparatus:				
7077	Receiving sets	328,380	410,475	1.25	7–29
7079	Receiving set components	42,239	62,513	1.48	11–36
7081	Other receiving set accessories	6,079	7,538	1.24	(1)
7082	Telegraph apparatus and parts	1,854	2,559	1.38	24
7083	Telephone instruments	933	1,754	1.88	50
7087	Telephone equipment and parts	45,055	46,407	1.03	10–60
	EXPORTS—Continued				
7159	Internal combustion engine accessories and parts	49,093	$49,584	$1.01	av. 45
7457	Pneumatic portable tools	4,308	4,567	1.06	24–140
7485	Other metal working machine tools and parts	1,969	2,599	1.32	15–69
7553	Sewing machine parts	45,560	80,186	1.76	39
7644	Bottling, bottle washing, and bottle labeling machinery and parts	78,215	87,601	1.12	8–27
	Accounting and calculating machines:				
7759	Card-punching, sorting and tabulating machines	914	1,417	1.55	16
7761	Parts for accounting and calculating machines	4,046	5,665	1.40	(1)
7764	Cash registers, new	9,730	12,162	1.25	17–31
7775	Typewriter parts	4,603	5,339	1.16	22
7779	Other office appliances and parts	15,652	17,687	1.13	(1)
7949	Aircraft parts and accessories [2]	9,794	14,985	1.53	1–12
7959	Other internal-combustion marine engines	9,117	10,940	1.20	23–30
8119	Vitamin and vitasterols	5,534	9,021	1.63	(1)
8127	Tablets, pills, capsules, powders, ointments, and similar manufactures	392,534	404,310	1.03	25
8155	Asthma, catarrh, and hay-fever preparations including inhalants	12,102	12,707	1.05	30–45
8167	Headache, neuralgia, and pain remedies	8,805	10,038	1.14	30–45
8755	Rouges	11,411	13,807	1.21	30
9005	Cameras, other than motion picture	7,259	10,301	1.42	av. 40
9010	Motion picture sound equipment, recording	3,714	5,497	1.48	(1)
9121.1	Exposed motion picture films, negative features (4,000 linear feet or over)	165	222	1.35	av. 40
	Other sensitized films, not exposed:				
9126.1	Packs of sheets, X-ray	15,107	25,273	1.67	23
9126.9	Packs of sheets, other	40,090	57,407	1.43	23–41
9143	Spectacles, eye glasses, goggles, lenses[2], and frames	39,446	54,436	1.38	11–41
9157	Surgical and medical instruments	14,898	19,665	1.32	21
9160	Survey and engineering instruments	6,216	8,143	1.31	18–33
9190	Other scientific laboratory and professional instruments and apparatus	109,173	117,907	1.08	3–87
9293	String instruments	35	36	1.03	2–6
9395	Typewriter ribbons	11,085	13,329	1.20	47
9433	Golf balls	1,260	2,243	1.78	18–33
9579	Other electric clocks and parts [2]	1,489	1,965	1.32	17–48
9629	Jewelry of other materials	1,087	1,826	1.68	(1)
9791	Incandescent lamp mantles	178	199	1.12	9
9825	Paint brushes except industrial	16,162	22,036	1.36	25
9830	Plates and cuts, electrotype, stereotype, halftone, lithographic or engraved	2,409	2,792	1.16	12–34
9860	Trunks	300	303	1.01	4–11
	Total	2,698,844	3,267,480	1.21	.....
	IMPORTS				
	Leather footwear, boots and shoes [2]:				
0350.2	Men's welt	436	$629	$1.44	14
0352.2	Women's and misses welt	44	57	1.30	11–12
0692.40	Women's and children's handbags or pocketbooks of leather	5	9	1.80	5–9
0699.81	Leather, belts, buckles, designed to be worn on the person	3,462	5,193	1.50	8
0862.50	Birds [3] valued at $5 each or less	19	30	1.58	(1)
0962.80	Shells [3]	25	25	1.00	(1)
	Sponges:				
0970.00	Sheepswool	105,820	191,234	1.81	(1)
0970.02	Velvet	10,072	10,878	1.08	(1)
2220.40	Drugs, herbs, leaves, etc., vegetables and animal drugs [2]	29,767	45,504	1.53	(1)
2921.90	Moss, seaweeds, and vegetable substances, crude or unmanufactured [3]	64	88	1.38	8–17
3113.90	Cotton wearing apparel, not knit or crocheted	11	13	1.18	(1)
3174.90	Cotton articles wholly or partly of lace	9	14	1.56	8–15
3230.70	Articles and manufactures of cotton [3]	4	5	1.25	(1)
3390.29	Flax manufactures [3]	9	9	1.00	(1)
3640.00	Wearing apparel [3], valued not more than $4 per pound	6	10	1.67	av. 17
3650.50	Embroidered wearing apparel	5	5	1.00	10–20
3740.40	Silk wearing apparel, not knit or crocheted, embroidered, or of lace	4	5	1.25	10
6845.10	Jewelry valued at over 20 cents, not over $5 per dozen pieces, necklaces, necklets and chokers	254	504	1.98	av. 32
7090.99	Electrical goods and parts, including signaling, welding, ignition apparatus, instruments (other than laboratory and devices)	273	355	1.30	(1)
8140.50	Preparations in capsules, pills, tablets, lozenges, troches, ampules, jubes, or similar forms, including powders put up in medicinal doses, non-coal-tar	72	128	1.78	25
8150.20	Medicinal preparations containing 20% or less of alcohol	389	471	1.21	25–45
8731.10	Articles of perfumery whether in sachets or otherwise and all preparations containing alcohol	34	39	1.15	av. 25
9023.00	Motion picture film, negatives, newsreels, undeveloped, made of American manufacture and exposed abroad	31	52	1.68	(1)

See footnotes at end of table.

Digitized by Google

TABLE 7.—*Commodities Valued at $0.50 or More Per Pound in United States Trade With Cuba, 1939*—Continued

[Group 2—Commodities valued from $1.00 to $1.99 per pound]

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	IMPORTS—Continued				
9503.40	Manuscripts [3]	87	$100	$1.15	30–40
9510.30	Maps, charts, blank books, slate books, and engravings	15	15	1.00	(1)
9510.31	Etchings, photographs, and drawings (except postcards and works of art)	92	135	1.47	30–40
9521.0	Cigar bands	752	1,040	1.38	(1)
9521.4	Labels and flaps [2]	2,992	3,178	1.06	43
9650.0	Works of art, collections in art manufacture, science and agriculture, antiquities	197	223	1.13	(1)
9670.10	Paintings, pastels, pen and ink drawings, copies, replicas, etc	29	$ 41	$1.41	(1)
9920.90	Containers of domestic or foreign manufacture, exported empty and returned filled or exported filled and returned empty	20,897	34,062	1.63	(1)
	Total	175,876	$294,051	$1.67	.....

[Group 3—Commodities valued from $2.00 to $2.99 per pound]

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	EXPORTS				
0313	Patent upper leather, goat and kid	97	$231	$2.38	10
	Furs:				
0716	Fox, other	67	175	2.61	6–17
0723	Opposum	9	25	2.78	6–17
0729	Other	11	24	2.18	6–17
0759	Miscellaneous fur manufactures	1,578	4,009	2.54	4–6
2268	Peppermint	3,100	7,593	2.45	21–42
2620	Cigars and cheroots	61	133	2.18	av. 23
3091.2	Dress and all other gloves—cotton woven or knit	47	101	2.15	av. 11
3185	Cotton laces, embroideries, and lace window curtains	20,266	45,194	2.23	8
3710	Silk tram, organzine, and hard twists	25,904	67,915	2.62	16–19
3711	Spun silk	51,005	116,011	2.27	16–19
3719	Sewing, embroidery, and crochet silk	22,175	47,402	2.14	16–19
	Rayon and other synthetic textiles:				
3852	Dresses, skirts, blouses, and other outerwear, not knit or crocheted	46,944	121,433	2.59	10
3853.1	Knit or crocheted dresses	932	2,648	2.84	10
3853.2	Other knit outerwear	2,238	5,439	2.43	8–12
3857.7	Sleeping and lounging garments, knit or woven	521	1,436	2.76	8–14
3921	Corsets, brassieres, and girdles	15,832	42,318	2.67	av. 12
5513	Mica, manufactured and manufactures of, other	755	1,791	2.37	av. 64
6179	Padlocks of iron, steel, and bronze	15,118	43,770	2.90	54–96
6230	Tungsten, metal, wire shapes and alloys	181	482	2.66	49
7037	Electric recording instruments	843	2,208	2.62	25
7076	Transmitting sets, tubes, and parts	29,990	63,878	2.13	9–36
7078	Radio receiving tubes	18,991	38,172	2.01	9
	Accounting and calculating machines:				
7752	Listing, adding, bookkeeping machines	1,908	4,675	2.45	16–24
7753	Typewriters, bookkeeping, and billing machines	2,162	4,930	2.28	15–20
7756	Listing, adding machines	11,531	24,562	2.13	16–34
7757	Calculating machines	4,916	14,257	2.90	16–23
	Biologics:				
8122	Vaccines for human use	15,929	45,717	2.87	(1)
8123	Glandular products, organotherapeutics, enzymes, ferments and culture media	33,920	74,625	2.20	(1)
8157	Proprietary medicinal preparations—malaria chill and fever remedies	2,851	6,186	2.17	30–45
	EXPORTS—Continued				
8756	Lipstick	20,472	$40,944	$2.00	av. 30
9001	Cameras, motion picture standard gage (less than 35 mm.)	1,987	5,347	2.69	36
	Exposed motion picture films:				
9121.5	Negative newsreels (less than 4,000 linear feet)	124	366	2.95	av. 40
9123.5	Positive newsreels (less than 4,000 linear feet	2,275	5,379	2.36	av. 40
9158	Surgical appliances, artificial limbs, crutches, trusses, etc	13,324	29,313	2.20	4–60
9247	Band instruments, brass wind instruments	2,088	5,502	2.64	6–14
9302	Mechanical pencils of other materials	1,099	2,646	2.41	17–30
9310	Fountain and stylographic pens of other materials	1,530	4,561	2.98	8–28
9436	Golf clubs	1,029	2,131	2.07	(1)
9610	Paintings, etchings, engraving, statuary	1,346	2,868	2.13	(1)
	Jewelry:				
9626	Other articles of other metals	5,938	16,449	2.77	(1)
9627	Men's jewelry of other materials	517	1,391	2.69	(1)
9628	Women's jewelry of other materials	4,386	12,851	2.93	(1)
9822	Toothbrushes	13,921	37,483	2.69	14
	Total	399,918	$954,571	$2.39	.....
	IMPORTS				
0895.50	Pigeons, fancy or racing	234	$615	$2.63	(1)
2601.00	Leaf for cigar wrappers, unstemmed	194,443	546,406	2.81	20–21
3112.70	Outerwear and articles, knit or crocheted, not embroidered [3]	14	35	2.50	(1)
3924.1	Hats, other, not sewed but blocked or trimmed straw	7	19	2.71	3–6
3965.9	Artificial and ornamental flowers, fruits, vegetable, grasses, leaves, stems or parts thereof [3]	9	21	2.33	3–6
6850.13	Metal articles valued above $5 per dozen pieces, compacts, powder, and vanity cases	5	12	2.40	(1)
9640.9	Other artistic antiques, works of art, etc. (except rugs and carpets) produced prior to the year 1830	56	154	2.75	(1)
	Total	194,768	$547,262	$2.81	.....

[Group 4—Commodities valued from $3.00 to $3.99 per pound]

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	EXPORTS				
0758	Fur waste, fur pieces, and damaged skins	64	$192	$3.00	6–17
	Wool wearing apparel:				
3675	Knit bathing suits	19,188	58,407	3.04	10
3680	Men's and boys' overcoats, suits, and pants	218	808	3.71	av. 17
	Silk wearing apparel:				
3755	Hosiery, women's full-fashioned silk	11,880	38,947	3.28	11
3759	Other silk wearing apparel	340	1,129	3.32	8–16
6168	Hand operated screwplates, bolts, dies, and tap wrenches	1,054	3,488	3.31	15–120
6197	Precision scales, balances, and weights for laboratory use	437	1,641	3.76	av. 18
7075.1	X-ray tubes	1,668	6,454	3.87	2
7099.1	Electric razors	415	1,321	3.18	16
	Aircraft:				
7946	Engines	287	1,000	3.48	10–40
7947	Parts and accessories	2,611	8,068	3.09	(1)
8121	Biologics, serums, and antitoxins for human use	17,395	63,493	3.65	(1)
	Motion-picture projectors:				
9007	Standard gauge (35 mm.)	1,723	6,774	3.93	av. 11
9008.2	Substandard gauge (less than 35 mm.) sound	496	1,960	3.95	14
9112	Stereopticians, magic lanterns, and other projection apparatus	5,237	18,225	3.48	(1)
	EXPORTS—Continued				
9116	Motion-picture films, negative, sensitized, not exposed, one inch or more in width	5,121	$19,950	$3.90	av. 40
9123.1	Exposed motion-picture films, positive features (less than 4,000 linear feet)	29,006	87,203	3.01	av. 40
9149	Other optical goods	7,890	25,406	3.22	(1)
9150	Dental instruments	416	1,553	3.73	13–20
9301	Mechanical pencils and other materials	2,776	8,366	3.01	17–30
9420	Fishing rods	154	493	3.20	14–23
9580	Watches without jewels	539	2,084	3.87	av. 46
9635	Jewelry findings, parts and materials	1,228	4,445	3.62	(1)
	Total	110,143	$361,407	$3.28	.....
	IMPORTS				
3288.6	Wearing apparel of regular fiber other than cotton [3]	2	$ 6	$3.00	5–16
4221.9	Books and bags, other wood or compositions of wood papier-mache and palm leaf	1	3	3.00	(1)
6900.24	Sterling silver tableware	10	31	3.10	19–49
9800.90	Cigar and cigarette cases of leather	75	272	3.63	3–24
	Total	88	$312	$3.55	.....

See footnotes at end of table.

Digitized by Google

TABLE 7.—*Commodities Valued at $0.50 or More Per Pound in United States Trade With Cuba, 1939*—Continued

[Group 5—Commodities valued from $4.00 to $4.99 per pound]

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	EXPORTS				
3729	Silk and velvet ribbons	872	$3,546	$4.07	12
	Silk wearing apparel:				
3754	Hosiery, women's and children's seamless	7,806	38,791	4.97	11
3799	Other silk manufactures	1,380	6,100	4.42	8
6956	Sterling and other solid silverware	1,840	8,843	4.81	17–43
7482	Milling cutters, machine-operated threading dies and taps, similar machine-operated metal cutting tools	339	1,682	4.96	15–69
	Exposed motion-picture films:				
9121.9	Negative, other (less than 4,000 linear feet)	96	475	4.95	av. 40
9123.9	Positive, other (less than 4,000 linear feet)	5,543	26,275	4.74	av. 40
9142	Ophthalmic lenses	2,603	10,840	4.16	9–27
	EXPORTS—Continued				
9248	Wood wind instruments	341	$1,543	$4.52	6–27
9315	Metallic pen points	2,456	10,305	4.20	39–45
	Total	23,276	$108,400	$4.66	.....
	IMPORTS				
6845.2	Bracelets valued over 20 cents but not over $5 per dozen pieces	40	$199	$4.98	(1)
6845.4	Other pieces of jewelry valued over 20 cents but not over $5 per dozen pieces	109	518	4.75	(1)
6845.6	Jewelry valued over $5 per dozen pieces necklaces, necklets and chokers	35	149	4.26	(1)
9800.81	Leather pouches for tobacco	6	27	4.50	(1)
	Total	190	$893	$4.70	.....

[Group 6—Commodities valued from $5.00 to $9.99 per pound]

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	EXPORTS				
0753	Fur wearing apparel	1,793	$10,837	$6.04	4–6
3742	Silk dresses, skirts, and blouses	259	1,316	5.08	10
3951	Men's and boys' fur-felt hats	5,768	47,638	8.26	3–10
6189	Sewing machine needles	3,094	25,230	8.15	37
6190	Other needles	1,577	11,513	7.30	37
7948	Aircraft instruments and parts	649	3,948	6.08	(1)
9000	Cameras, motion picture standard gauge (25 mm.)	182	1,350	7.42	36
9002.3	Aerial, studio, photo engraving, coin-operated and similar types of cameras for professional, scientific, or commercial uses	584	3,824	6.55	17–40
9006	Parts of cameras except lenses	283	1,694	5.99	(1)
9113	Positive film, less than one inch in width	147	747	5.08	av. 40
9114	Negative film, less than one inch in width	2,147	13,634	6.35	av. 40
9309	Fountain and stylographic pens of plastic	5,720	36,493	6.38	15
9312	Parts of fountain and stylographic pens	223	1,703	7.64	8–42
9421	Fishing reels	117	801	6.85	(1)
9470	Revolvers and pistols	1,028	7,467	7.26	av. 42
	Jewelry:				
9621	Men's jewelry of other metals	6,090	33,066	5.43	32
	EXPORTS—Continued				
9623	Women's jewelry of other metals	8,562	$61,906	$7.23	32
	Total	38,223	$263,167	$6.89	.....
	IMPORTS				
0352.1	Women's and misses leather boots and shoes, McKay sewed	7	$ 45	$6.43	7–14
0692.3	Coin purses, change purses, billfolds, etc.	123	1,092	8.88	9
6845.7	Bracelets valued over $5 per dozen pieces	45	247	5.49	32
8725.2	Perfumery and toilet waters	6	59	9.83	25
9503.6	Stamps, foreign postage, or revenue and foreign Government stamped envelopes or postcards	341	3,134	9.19	3–24
9919.3	Photographic dry plates and films of American manufacture (except motion picture films for commercial purposes) exposed abroad whether developed or not	152	1,192	7.84	18–41
	Total	674	$5,769	$8.56	.....

[Group 7—Commodities valued from $10.00 to $24.99 per pound]

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	EXPORTS				
0733	Silver and black fox, dressed or dyed	20	$420	$21.00	6–17
0749	Other dressed and dyed furs	44	860	19.55	6–17
6997	Gold manufactures [2]	294	5,077	17.27	(1)
9147	Lenses, not fitted to instruments	72	1,647	22.88	45
9152	Teeth	1,556	28,050	18.03	(1)
9589	Watch parts	111	1,304	11.71	25–66
	Total	2,097	$37,358	$17.81	.....
	IMPORTS				
3085.2	Cotton quilts or bedspreads, jacquard	1	$ 10	$10.00	16–14
3912.2	Straw hats, not bleached, dyed, colored, or stained	1	21	21.00	3–6
	IMPORTS—Continued				
6845.9	Other jewelry valued at $5 per dozen pieces	79	$953	$12.06	32
6850.09	Metal articles other than metal buckles valued at over $5 per dozen pieces	2	21	10.50	32
9025.8	Other motion picture film positives or duplicates (4,000 linear feet)	13	137	10.54	av. 40
9220.5	Phonograph, gramophone or graphophone records [3]	64	1,104	17.25	40
9620.10	Original paintings, pastels, drawings, and sketches	187	2,505	13.40	5–24
	Total	347	$4,751	$13.69	.....

[Group 8—Commodities valued at $25.00 or more per pound]

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	EXPORTS				
6922	Ingot sheets, wires, alloys and scrap	71	$4,608	$64.90	(1)
6929	Platinum and allied metals, manufactures, except jewelry	1	47	47.00	(1)
9154	Dental gold and precious metal alloys for dental purposes	76	3,635	47.83	(1)
9581	Watches with jewels	33	1,268	38.42	av. 46
9620	Jewelry of solid gold or platinum	4	348	87.00	(1)
	Total	185	$9,906	$53.55	.....
	IMPORTS				
9025.6	Motion picture film positives or duplicate features (4,000 linear feet)	7	$287	$41.00	av. 40
	Total	7	$287	$41.00	-----

[1] Not available.
[2] Not elsewhere specified.
[3] Not specially provided for.

SOURCE: Foreign Commerce and Navigation of the United States, Calendar Year 1939, U. S. Department of Commerce.

Digitized by Google

TABLE 8.—*Perishable Commodities in United States Trade With Cuba, 1939*

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	EXPORTS				
	Animals edible:				
0010	Cattle for breeding	80,634	$19,805	$0.25	(1)
0012	Other cattle	3,504	2,000	.57	(1)
0013	Hogs (swine)	4,830	600	.12	(1)
0016	Sheep	200	57	.29	(1)
0019	Poultry	3,097	2,222	.72	(1)
	Meat products:				
0020	Beef and veal, fresh or frozen	12,317	4,244	.34	25–50
0027	Pork, fresh or frozen	75,331	5,168	.07	25–36
0034	Mutton and lamb	17,628	4,375	.25	(1)
0040	Poultry and game, fresh	7,195	1,649	.23	(1)
0043	Tongues, fresh, frozen or cured	1,876	282	.15	25–50
0053	Lard	63,191,627	3,813,714	.06	av. 36
0059	Oleomargine of animal and vegetable fats	300	46	.15	(1)
0060	Mil, and cream, fresh and sterilized	3,596	245	.07	47
0065	Butter	271	53	.20	37
	Fresh fish:				
0070	Salmon, fresh	885	113	.13	38–52
0071	Other fresh fish	119,140	6,576	.06	38–52
	Shellfish, not canned:				
0072	Oysters, fresh in the shell, shucked, frozen or in ice	14,132	874	.06	37
0074	Shrimps, fresh, frozen or in ice	15,396	1,398	.09	(1)
0092	Eggs in the shell [2]	2,971	953	.32	24
	Animals:				
0900	Horses for breeding	779	500	.64	(1)
0901	Other horses	73,944	11,000	.15	(1)
0903	Mules, asses, and burros	2,652	500	.19	(1)
0909	Other live animals	4,184	1,297	.31	(1)
	Vegetables, fresh:				
1207	Beans	64,403	3,065	.05	19–48
1209	Peas, green	49,367	1,743	.04	15–23
1210	Peppers	798	50	.06	14–23
1213	Tomatoes	60,598	3,757	.06	29–36
1224	Other fresh vegetables	5,309,800	106,196	.02	14–48
1256	Yeast	10,724	4,366	.41	22
	Subtropical fruits:				
1302	Grapefruit	8,920	94	.01	34–43
1303	Lemons	15,822	795	.05	30–44
1305	Oranges	55,410	1,273	.02	34–43
1309	Cherries	13,814	1,732	.13	23–42
1313	Berries	22,248	2,234	.10	14–34
1314.1	Watermelons	8,085	249	.03	(1)
1314.5	Other melons	34,699	2,453	.07	31–40
1315	Grapes	2,270,412	75,928	.03	24–40
1316	Pears	1,588,969	56,212	.04	35–39
1317	Peaches	71,328	3,399	.05	32–37
1318	Prunes and plums	213,798	9,739	.05	33
1319.1	Apricots	452	36	.08	33
1319.9	Other fresh fruits	137,850	2,757	.02	24–40
2535	Flowers and foliage, cut, fresh and preserved [2]	32,583	7,494	.23	av. 20
2599	All other nursery or greenhouse stock [2]	4,388	3,510	.80	16
	Biologics:				
8120	For animal and veterinary use	136,688	120,286	.88	(1)
8121	Serums and antitoxins for human use	17,395	63,493	3.65	(1)
8122	Vaccines for human use	15,929	45,717	2.87	(1)
8123	Glandular products, organotherapeutics, enzymes, ferments and culture media	33,920	$74,625	$2.20	(1)
	Total	73,814,889	$1,468,874	$0.06	.....
	IMPORTS				
	Animals edible:				
0014.0	Turkeys, live	95	$ 10	$0.10	(1)
0015.0	Chickens, ducks, geese, and guineas, live	2,990	715	.24	(1)
	Meats fresh, chilled or frozen:				
0018.0	Beef	166,625	15,971	.10	28–49
0023.5	Game, except birds	45,719	13,628	.30	(1)
0023.6	Edible offal (livers, kidneys, tongues, hearts, sweet breads, tripe and brains)	71	16	.23	47–54
0044.0	Butter	145,881	19,186	.13	31–44
0056.9	Other fresh or frozen fish, whole or beheaded, or eviscerated or both	2,837	263	.10	31–36
0083.0	Lobsters, including spiny lobsters and crawfish, not canned	241,902	29,370	.12	37
0086.2	Turtles	631	51	.08	(1)
0086.4	Crabs, fresh or frozen, not crab meat	13,392	2,560	.19	(1)
0850.1	Other horses, valued at over $150 per head	858	175	.20	(1)
	Live birds [3]:				
0862.3	Songbirds valued at $5 or less each	370	300	.81	(1)
0862.5	Birds [4], valued at $5 or less each	19	30	1.58	(1)
0895.0	Game animals and birds for stocking purposes	71	40	.56	(1)
0895.5	Pigeons, fancy or racing	234	615	2.63	(1)
	Vegetables and preparations:				
1191.1	Lima beans, green and unripe	4,400,627	102,990	.02	42–46
1191.2	Other, green and unripe beans	6,365	192	.03	25–53
1196.0	Peas (except cowpeas and chickenpeas) green and unripe	27,299	1,186	.04	43
1207.0	Tomatoes, natural state	37,563,359	595,822	.02	(1)
1210.0	Okra, fresh	2,507,944	75,574	.03	(1)
1210.05	Peppers, fresh	2,047,613	39,042	.02	(1)
1210.06	Eggplant, fresh	4,812,929	82,221	.02	(1)
1210.07	Cucumber, fresh	2,562,381	44,448	.02	(1)
1210.08	Squash, fresh	5,334	133	.02	(1)
1210.16	Dasheens, fresh	89,881	1,263	.01	(1)
1210.19	Other fresh vegetables	471,679	9,248	.02	(1)
1250.90	Edible preparations for human consumption, vegetable and other	2,400	48	.02	(1)
	Fruits and preparations:				
1300.00	Plantains, green or ripe	5,099,900	50,999	.01	(1)
1301.00	Bananas, green or ripe	131,221,447	2,096,148	.02	(1)
1302.00	Grapefruit	5,167,691	55,421	.01	30
1308.00	Pineapples in crates of 2.45 cu. inches	87,530,236	1,131,868	.01	28
1308.10	Pineapple in bulk	582,625	6,536	.01	28
1330.31	Oranges	150	4	.03	34
1330.42	Watermelons	490,526	11,518	.02	(1)
1330.43	Other melons	2,444	29	.01	(1)
1330.45	Avocados (alligator pears)	8,925,622	146,492	.02	19–25
	Total	294,140,147	4,534,112	0.02	.....

[1] Not available.
[2] Included also in table 9 (fragile).
[3] Not elsewhere specified.
[4] Not specially provided for.
SOURCE: Foreign Commerce and Navigation of the United States, Calendar Year 1939, U. S. Department of Commerce.

TABLE 9.—*Fragile Commodities in United States Trade With Cuba, 1939*

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	EXPORTS				
0092	Eggs in the shell [1]	2,971	$953	$0.32	24
2535	Flowers and foliage, cut, fresh, and preserved [1]	32,583	7,494	.23	av. 20
2599	All other nursery or greenhouse stock [1]	4,388	3,510	.80	16
5212	Plate glass	850,679	110,027	.13	64–80
5215	Cylinder, crown, and sheet glass	89,865	5,613	.06	45–100
5217	Laminated glass and manufactures	1,634	1,994	1.22	14–80
5218	Rolled glass	577,796	36,759	.06	30–60
5220	Rolled, cylinder, crown and sheet glass obscured by coloring prior to solidification, not less than ¼ inch in thickness	33,855	6,625	.20	30–100
5230	Other glass	32,105	7,063	.22	(2)
5232	Pharmaceutical and proprietary ware including prescription bottles, ampules, and vials	4,207,350	252,441	.06	11–26
5234	Beverage bottles, including beer, soda, and alcoholic beverage bottles	20,009,100	400,182	.02	22–30
5235	Used glass containers, all types	432,800	17,312	.04	22–30
5236	Other unfilled glass containers	2,307,500	92,300	.04	22–30
	EXPORTS—Continued				
5237	Tumblers, drinking glasses, and stemware, plain and cut or engraved	1,538,760	$76,938	$0.05	12–25
5239	Table glassware [3], plain, cut or engraved	4,155,500	207,775	.05	12–30
5255	Lamp chimneys and lantern globes	37,657	5,272	.14	3–9
5261	Globes and shades for lighting fixtures	108,250	12,990	.12	3–9
5291	Chemical glassware	34,765	15,839	.46	6–9
5292	Glass electric insulators	46,104	3,604	.08	30
5299	Other glassware	582,940	53,294	.10	(2)
5320	Table and kitchen articles and utensils	131,232	18,372	.14	12–36
6197	Precision scales, balances, and weights for laboratory use	437	1,641	3.76	a v. 18
7035	Watt-hour and other measuring meters	55,595	47,256	.85	37–64
7036	Electrical indicating instruments	4,806	8,602	1.79	5–17
7037	Electrical recording instruments	843	2,280	2.70	25
7038	Other electrical testing apparatus and parts	15,405	15,559	1.01	(2)
	Electric incandescent lamps:				
7063	For automobiles, flash lights, and Christmas trees	16 751	21,776	1 30	5-12

See footnotes at end of table.

Digitized by Google

TABLE 9.—*Fragile Commodities in United States Trade With Cuba, 1939*—Continued

Class No.	Commodity	Shipping weight (gross pounds) [1]	Value	Value per pound	Density
	EXPORTS—Continued				
7064	Other metal filament lamps	276,721	$185,403	$0.67	5–12
7065	Other electric lamps	11,530	5,765	.50	4–12
7067	Floodlights	6,313	2,525	.40	8–15
7075.1	X-ray tubes	1,668	6,454	3.87	2
7075.5	Other X-ray apparatus and other parts	48,232	38,103	.79	14–60
7075.9	Other therapeutic apparatus and parts	8,023	8,906	1.11	[2]
	Radio apparatus:				
7076	Transmitting sets, tubes, and parts	29,990	63,878	2.13	9–36
7077	Receiving sets	328,380	410,475	1.25	7–29
7078	Radio receiving tubes	18,991	38,172	2.01	9
7079	Receiving set components	42,329	62,513	1.48	11–36
7080	Loud speakers	6,817	2,795	.41	13
7081	Other receiving set accessories	6,079	7,538	1.24	[2]
7082	Telegraph apparatus and parts	1,854	2,559	1.38	24
7083	Telephone instruments	933	1,754	1.88	50
7092	Starting, lighting, and ignition equipment	37,466	16,187	.43	[2]
7099.1	Electric razors	415	1,321	3.18	16
7741	Gas meters and parts	38,045	12,555	.33	[2]
7742	Water meters and parts	17,408	8,356	.48	[2]
	Accounting and calculating machines:				
7752	Listing, adding, bookkeeping machines	1,908	4,675	2.45	16–24
7753	Typewriter,-book-keeping,-billing machines	2,162	4,930	2.28	15–20
7756	Listing and adding machines	11,531	24,562	2.13	16–34
7757	Calculating machines	4,916	14,257	2.90	16–23
	Cash registers:				
7764	New	9,730	12,162	1.25	17–31
7766	Used and rebuilt	3,712	1,262	.34	17–31
7767	Parts	3,843	3,766	.98	23
	Typewriters:				
7770	New standard	75,014	62,262	.83	19
7772	New portable	23,193	19,018	.82	24
7774.1	Rebuilt	21,941	12,287	.56	20
7774.9	Other used	12,963	8,167	.63	20
7948	Aircraft instruments and parts	649	3,948	6.08	[2]
	Explosives:				
8601	Smokeless powder explosives	6,432	4,765	.74	53
8604	Dynamite	883,660	114,249	.13	48
8609	Other explosives	2,088	974	.47	30–53
	Fuses and blasting caps:				
8625	Safety fuses	51,500	12,560	.24	22–28
8629	Blasting caps	72,886	21,530	.30	36
	Cameras:				
9000	Motion picture standard gauge (35 mm.)	182	1,350	7.42	36
9001	Motion picture substandard gauge (less than 35 mm.)	1,987	5,347	2.69	36
9002.3	Aerial, studio, photo engraving, coin-operated and similar types of cameras for professional, scientific or commercial uses	584	3,824	6.55	17–40
9003	Other than motion-picture box type (set focus)	6,512	5,028	.77	17–40
9005	Other than motion picture, other	7,259	10,301	1.42	av. 40
9006	Parts of cameras except lenses	283	1,694	5.99	[3]
	Motion-picture projectors:				
9007	Standard gauge (35 mm.)	1,723	6,774	3.93	av. 11
9008.1	Substandard gauge (less than 35 mm.) silent	4,600	3,562	.77	20–28
9008.2	Substandard gauge (less than 35 mm.) sound	496	1,960	3.95	14
	Motion picture sound equipment:				
9010	Recording	3,714	5,497	1.48	[2]
9011	Reproducing	23,070	21,686	.94	[2]
9112	Stereopticians, magic lanterns, and other projection apparatus	5,237	18,225	3.48	[2]
	Optical goods:				
9142	Ophthalmic lenses	2,603	10,840	4.16	9–27
9143	Spectacles, eyeglasses, goggles, lenses [3] and frames	39,446	54,436	1.38	11–41
9147	Lenses not fitted to instruments	72	1,647	22.88	45
9149	Other optical goods	7,890	25,406	3.22	[2]
9160	Surveying and engineering instruments	6,216	8,143	1.31	18–33
9190	Other scientific laboratory and professional instruments and apparatus	109,173	117,907	1.08	3–87
9242	Phonograph records [4]	65,282	24,807	.38	40
9293	String instruments	35	36	1.03	2–6
9570	Clocks, electric	15,646	8,472	.54	16
9571	Clocks [3], except electric, 1-day alarm clocks	61,211	$53,574	$0.88	26–40
9572	Mantle, novelty and wall clocks	4,945	1,832	.37	26–40
9579	Other clocks and parts	1,489	1,965	1.32	17–48
	Watches:				
9580	Without jewels	539	2,084	3.87	av. 46
9581	With jewels	33	1,268	38.42	av. 46
9589	Parts	111	1,304	11.75	25–66
9591	Time recording devices and parts	3,778	2,947	.78	[2]
9610	Paintings, etchings, engravings, statuary	1,346	2,868	2.13	[2]
	Lamps and illuminating devices, except electric:				
9791	Incandescent mantles	178	199	1.12	9
9792	Lanterns, wick	58,752	10,022	.17	9–17
9793	Gasoline pressure lamps, lanterns and parts	2,161	1,210	.56	3–22
9794	Other lamps except electric	5,361	1,012	.19	3–22
9832	Candles	15,704	2,615	.17	23–41
	Total	37,838,521	$3,058,946	$0.08	
	IMPORTS				
	Nursery and greenhouse stock:				
2559.3	Grafted and budded plants, cuttings and seedlings of ornamental trees, shrubs, vines and all nursery or greenhouse stock [5]	[2]	$ 19	[2]	[2]
2559.5	Cuttings and seedlings of fruit vines, plants or bushes	[2]	2,100	[2]	[2]
3965.9	Artificial and ornamental flowers, fruits, vegetables, grasses, grains, leaves, stems or parts thereof [5]	9	21	$2.33	3–6
5260.27	Bottles, jars holding over one pint	1,171	30	.03	[2]
	Illuminating articles of every description, finished or unfinished, wholly or in chief value of glass and parts thereof [5]:				
5273.1	Chimneys	56	14	.25	6
5273.5	Other	800	200	.25	6–8
5278 3	Table and kitchen articles and utensils blown or partly blown (except cut or engraved, valued at $1 or more each pressed or otherwise produced or colored, etched or engraved, etc,)	67	4	.06	12–25
5278.9	Other pressed, not colored, etc., glass and manufactures [3]	57	20	.35	12–25
5290.7	Glass mirrors [5], not exceeding 144 sq. inches in size with or without frames or cases	227	100	.44	8–75
5350.2	Table and kitchen articles and utensils, domestic and household ware, decorated and colored, etc	64	39	.61	[2]
5360.52	China and porcelain, vitrified and non-absorbent and manufactures of [5]	335	11	.03	8–30
5373.7	Earthenware and stoneware and manufactured [5]	10	8	.80	15–19
5374.2	Common yellow, brown, red, or gray earthenware:				
5374.3	Not ornamented or decorated	4,800	144	.03	15–19
5380.51	Ornamented, decorated, etc	5,350	107	.02	15–19
5380.52	Cement floor and wall tiles (including tiles wholly or in part of cement) not over 40 cents per square foot	129,015	1,711	.01	50–78
5380.71	Ceramic mosiacs, valued at not over 40 cents per square foot	114	40	.35	50–78
5380.81	Other unglazed floor and wall tiles, valued at not over 40 cents per square foot	31,869	252	.01	50–78
5380.91	Other glazed floor and wall tiles valued at not over 40 cents per square foot	38,505	218	.01	50–78
9220.5	Other tiles valued at not over 40 cents per square foot	[2]	10,435	[2]	50–78
9640.0	Phonograph, gramophone or graphophone records [5]	64	1,104	17.25	40
	Artistic antiques, works of art etc., furniture	82	60	.73	[2]
	Total	212,595	$16,637	$0.08	

[1] Included also in table 8 (perishable).

[2] Not available.

[3] Not elsewhere specified.

[4] Included also in table 10 (style).

[5] Not specially provided for.

SOURCE: Foreign Commerce and Navigation of the United States, Calendar Year 1939, U. S. Department of Commerce.

Digitized by Google

TABLE 10.—*Style Factor Commodities in United States Trade With Cuba, 1939*

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	EXPORTS				
	Women's and chi.dren's handbags, pocketbooks, and purses:				
0688	Leather	16,042	$20,872	$1.30	5–9
0689	Other materials	153,215	105,143	.69	5–9
0753	Fur wearing apparel	1,793	10,837	6.04	4–6
3122	Women's dresses and ensembles	18,030	24,616	1.37	av. 11
3675	Knit bathing suits	19,188	58,407	3.04	10
3681	Women's and children's wool clothing	3,538	5,704	1.61	16
3742	Silk dresses, skirts, and blouses	259	1,316	5.08	10
3759	Other silk wearing apparel	340	1,129	3.32	8–16
3799	Other silk manufactures	1,380	6,100	4.42	8
3852	Dresses, skirts, blouses and other outerwear, not knit or crocheted	46,944	121,433	2.59	10
3853.1	Knit or crocheted dresses and ensembles	932	2,648	2.84	10
3853.2	Other knit outerwear	2,238	5,439	2.43	8–12
	Hats and hat bodies of straw, palm leaf, etc.:				
3944	Sewed	5,331	4,620	.87	3–10
3945	Other woven	2,846	3,045	1.07	3–10
	Exposed motion-picture films:				
9121.1	Negative features 4,000 linear feet and over	165	222	1.35	av. 40
9121.5	Negative newsreels (less than 4,000 linear feet)	124	366	2.95	av. 40
9121.9	Negative, other (less than 4,000 linear feet	96	475	4.95	av. 40
9123.1	Positive features (4,000 linear feet or over)	29,006	87,203	3.01	av. 40
9123.5	EXPORTS—Continued Positive newsreels (less than 4,000 feet)	2,275	$5,379	$2.36	av. 40
9123.9	Positive, other, (less than 4,000 linear feet)	5,543	26,275	4.74	av. 40
9242	Phonograph records [1]	65,282	24,807	.38	40
9516	Catalogs and pamphlets	59,520	17,856	.30	30–40
9523	Music in books or sheets	14,700	5,586	.38	30–40
9560	Calendars, printed or unprinted and advertising novelties	30,246	7,259	.24	30–40
	Total	479,033	$546,737	$1.14	.....
	IMPORTS				
	Women's and misses' leather footwear, boots and shoes [2]:				
0352.1	McKay sewed	7	$45	$6.43	7–14
0352.2	Welt	44	57	1.30	7–14
0352.9	Other	745	447	.60	7–14
0692.4	Women's and children's handbags or pocketbooks of leather	5	9	1.80	5–9
9220.5	Phonograph, gramophone or graphophone records [1] [2]	64	1,104	17.25	40
	Total	865	$1,662	$1.92	.....

[1] Included also in table 9 (fragile).

[2] Not elsewhere specified.

SOURCE: Foreign Commerce and Navigation of the United States, Calendar Year 1939, U. S. Department of Commerce.

Appendix

The volume of air cargo which will move between the United States and foreign countries after the war will depend upon a number of economic factors, such as the comparative speeds, costs, reliability, convenience, and quality of service of air carriers compared with surface carriers. A substantial part of air-cargo tonnage which is likely to move will consist of commodities which previously moved by steamship, while an unknown percentage of future air-cargo shipments will consist of new traffic, especially perishables, made possible by the much faster service offered by air carriers.

In initiating this series of studies, it is believed that an analysis of prewar trade will furnish some indication of the specific commodities that may be diverted to air carriers in the postwar period. Since the year 1939 is the latest period during which United States trade with Latin America did not show the effects of war, it was decided to use the United States export and import statistics for that year as the basis for study. In studying the thousands of commodities which moved between the United States and Latin American countries, it was agreed that at least four basic factors are of major importance in determining which should be selected as offering the best prospects for transport by air. These are as follows: (1) Value per pound, (2) perishability, (3) fragility, and (4) style factor, including obsolescence.

It is recognized that no single one of these factors is necessarily of sufficient importance to justify the higher charges which will have to be made for air carriage in comparison with surface transport. It is also evident that a commodity which appears suitable for air carriage on the basis of only one factor is not as likely to go by air as one which is suitable on the basis of two or more factors. For example, a commodity worth $5 per pound which is also perishable, fragile, or possessed of a style factor is more likely to go by air than a commodity equally valuable lacking any of these other favorable characteristics.

In addition to the four major categories covered in this study there are others which merit investigation. Among these may be mentioned economies in packing, insurance, size of shipment, density, and various capital costs. Not all of these have been investigated here because the foreign trade statistics utilized did not lend themselves to such analyses. The experience of the Army and Navy air-transport services during the present war has demonstrated that substantial packing economies are possible for almost all commodities flown. These economies for certain commodities have reached 70 percent of the total shipping weight, while the average reduction in shipping weight has been reported as approximately 30 percent A special study of potential packing economies is planned for the commodities included under the four categories shown in this report.

In the past many commodities have been shipped by air to meet emergency situations with little consideration given to cost of service. It is clear that almost any commodity regardless of its economic characteristics may be sent by air under conditions of extreme emergency. Perishable pharmaceuticals and machine tools and parts are classes of commodities which have previously constituted important emergency shipments. Practically all of these are already included in this study because of their high value per pound. In addition to strictly emergency shipments, there will be shipments of odd items for the filling in of inventories where sudden or unexpected increases in demand result in shortages.

Categories Described

In deciding which commodities should be included in the four categories adopted, the question of definition of terms immediately arose, especially in the case of categories 2, 3, and 4 which cover perishability, fragility, and style factor. The bases for selection are briefly described below:

1. Value Per Pound

In determining which commodities should be screened on the basis of value per pound it was necessary to decide first whether net weight or shipping weight should be used, then to decide upon the minimum value per pound, and finally, after a minimum value per pound had been chosen, into how many subclasses the commodities falling above this minimum should be divided.

Since the charges to the shipper are based on gross shipping weights, rather than net weights, it was concluded that

Digitized by Google

such weights were the proper ones to use in an analysis of air-cargo potentials, and they will be used exclusively in each study of the series except the first. The first study covering trade between the United States and Brazil was begun at a time when an adequate body of data on gross shipping weights was not readily available. More recently such data have become available. In the United States-Brazil study, asterisks indicate where net weights are used.

After consultation with various commodity specialists it was decided that all commodities with a value of less than $0.50 per pound should be eliminated from the first category. It was felt that few commodities below that minimum would offer prospects for air carriage in the immediate post-war period. In fact, it is believed that many commodities above $0.50, particularly between $0.50 and $1, offer slight prospects for air-carriage unless additional factors, such as perishability, fragility, or style factor are also involved. A commodity worth $0.50 a pound has a value of $1,000 per ton. If it is assumed that the typical air-borne commodity moves 4,000 miles between the United States and South America and that the air-line charge is $0.15 per ton-mile, then the transportation charges on 1 ton would equal $600 or 60 percent of the value of the commodity. A commodity worth $3 a pound has a value of $6,000 per ton. On the basis of the assumptions just stated, air-cargo charges would amount to $600 or only 10 percent of the value of the commodity. These figures may be compared with the analogous relationships for movement of railway freight in the United States. In 1939 railway freight revenue equalled 8.43 percent of the value of all commodities carried.

The commodities valued at $0.50 per pound and over have been divided into eight groups as follows:

Group 1—$0.50-$0.99 per pound.
Group 2—$1-$1.99 per pound.
Group 3—$2-$2.99 per pound.
Group 4—$3-$3.99 per pound.
Group 5—$4-$4.99 per pound.
Group 6—$5-$9.99 per pound.
Group 7—$10-$24.99 per pound.
Group 8—$25 up per pound.

It is evident not only that the commodities in the higher-value groups offer better prospects for air carriage than those in the lower groups, but also that a larger percentage of the commodities in the higher-value groups are likely to go by air. For example, if 2 percent of the commodities in group 1 appear to offer especially good prospects for air carriage it might be expected that 4 percent in group 2, 6 percent in group 3, and so on would offer similar prospects.

2. Perishability

In determining the list of commodities to be included under the second category, perishability, it was necessary first to define the term perishable. It is evident that a large number of commodities would be perishable if a long enough time period and sufficient exposure to the elements were assumed. In deciding whether or not a commodity is perishable when moving in international trade, consideration has been given only to the normal time spent in transit via usual surface methods of transportation, assuming customary packing, handling, and stowage of the commodity. If, for example, apples packed in barrels can be shipped from New York to Rio de Janeiro in 4 weeks, while apples packed in barrels normally do not deteriorate in less than 8 weeks, then apples, for the purposes of this study, will not be considered perishable. It should be pointed out that any commodity which requires refrigerants, special temperature control, or ventilation during the period of movement is also classed as perishable.

In order to determine which of the commodities met the tests of the definition aforementioned, the cooperation of numerous commodity specialists of the Department of Commerce and other Government agencies was secured.

3. Fragility

Fragility, or breakability, is a term which, like perishability, could characterize almost all commodities under certain conditions. For the purposes of this study a commodity is defined as fragile or breakable when special care in handling or special packing is required to avoid damage under normal conditions of shipment. No attempt has been made to classify the commodities selected in respect to differing degrees of fragility.

4. Style Factor

Under the category designated style factor are included all of those commodities which lose their economic value at an exceptionally rapid rate with the passage of time because of a decline in the demand rather than a change in the physical nature of the product. Products which are subject to obsolescence are included. Examples of such are newspapers, motion-picture films, and certain textiles, such as wearing apparel.

Density or Weight

The density or weight per cubic foot of a commodity is one factor affecting the cost of moving commodities. In any transportation vehicle where space rather than weight is the limiting factor, a commodity with a low density costs more per unit of weight to move than one with a higher density, and consequently, must be charged a higher rate per ton-mile. In this series of studies the density is shown where the information is available for all commodities included in the four categories listed above. In some instances, no specific density range is shown but instead a density range is given. This indicates a variation in the method of packing. Some commodity classifications, furthermore, cover such a wide range of individual articles lumped together that it is impossible to determine either a *specific* density or a density range. An example of this type of "basket" classification is Export Class No. 0699 (Other Leather Manufactures).

Upon analysis, density appears to be of less importance than the four major criteria already discussed, and, on the basis of new designs for post-war air cargo planes, may become even less significant in the future.

Size of Shipments

The economic and technological characteristics of steamship operations make this form of transportation especially suitable for large shipments of goods weighing many tons. These characteristics are reflected in steamship freight-rate structures which in many instances are quoted in terms of 1 ton or 40 cubic feet. Since it is customary to levy a minimum bill of lading charge, which between the United States and Brazil, for example, amounts to $7.50, as shipments fall below a certain weight, the rate per ton-mile rises progressively so that in case of shipments of 25 or 50 pounds the rate per ton-mile will be several times that of a shipment weighing 1 ton or more. On such small shipments, therefore, the differences in costs between steamship and air carrier services are reduced to a minimum and air carriers will enjoy their most favorable competitive position.

The only important alternative to the freight services offered by the steamship companies is parcel post, which limits maximum shipments to a few pounds. Frequently, parcel-post charges, when reduced to a rate per ton-mile basis, amount to $0.06 or $0.08 per ton-mile for shipments of 25 to 30 pounds.

It is impossible to determine from published foreign trade statistics what commodities are shipped in quantities weighing less than 1 ton. The figures show the total weight shipped per year for individual commodities, and, in many instances, such shipments total much less than 2,000 pounds but it can not be determined whether these small shipments were shipped individually or consolidated with other commodities in lots weighing 1 ton or more. In recent years it has become increasingly prevalent for producers and freight forwarders to consolidate small shipments into large ones to take advantage of the lower steamship rates available on large shipments.

Digitized by Google

Postwar Air Cargo Rates

Recent estimates of the level of air cargo rates after the war vary from $0.05 to $0.25 per ton-mile. The differences in the estimates are primarily the result of differences in the assumptions on which the forecasts are based or on the completeness of the services under consideration. Some authorities in estimating air cargo rates have in mind airport-to-airport movement only, while others include terminal handling and pick-up and delivery services. Some writers in making postwar predictions are thinking of the period immediately following the cessation of hostilities rather than developments during the first decade. Still others base their predictions upon the assumption that the latest technological improvements will be incorporated into exclusively designed air cargo planes and that these planes will be available shortly after the war.

In the case of air cargo carriage between the United States and Latin American countries in the immediate postwar period, air cargo rates per ton-mile will depend upon whether the traffic in both directions is sufficiently large to justify specially designed air cargo planes which carry nothing but commodities. If the volume of traffic should prove to be this large, air cargo rates from airport to airport may prove to be feasible at a level of from $0.10 to $0.15 per ton-mile depending upon the territory served. If, on the other hand, air cargo volume proves to be so small that it must be carried in aircraft especially designed for the transportation of passengers and mail, then air cargo rates will probably be substantially higher.

☆U. S. GOVERNMENT PRINTING OFFICE: 1946—707796—105

Digitized by Google

Documents Room

International Trade Office

Industrial Reference Service

U. S. DEPARTMENT OF COMMERCE, W. AVERELL HARRIMAN, *Secretary*

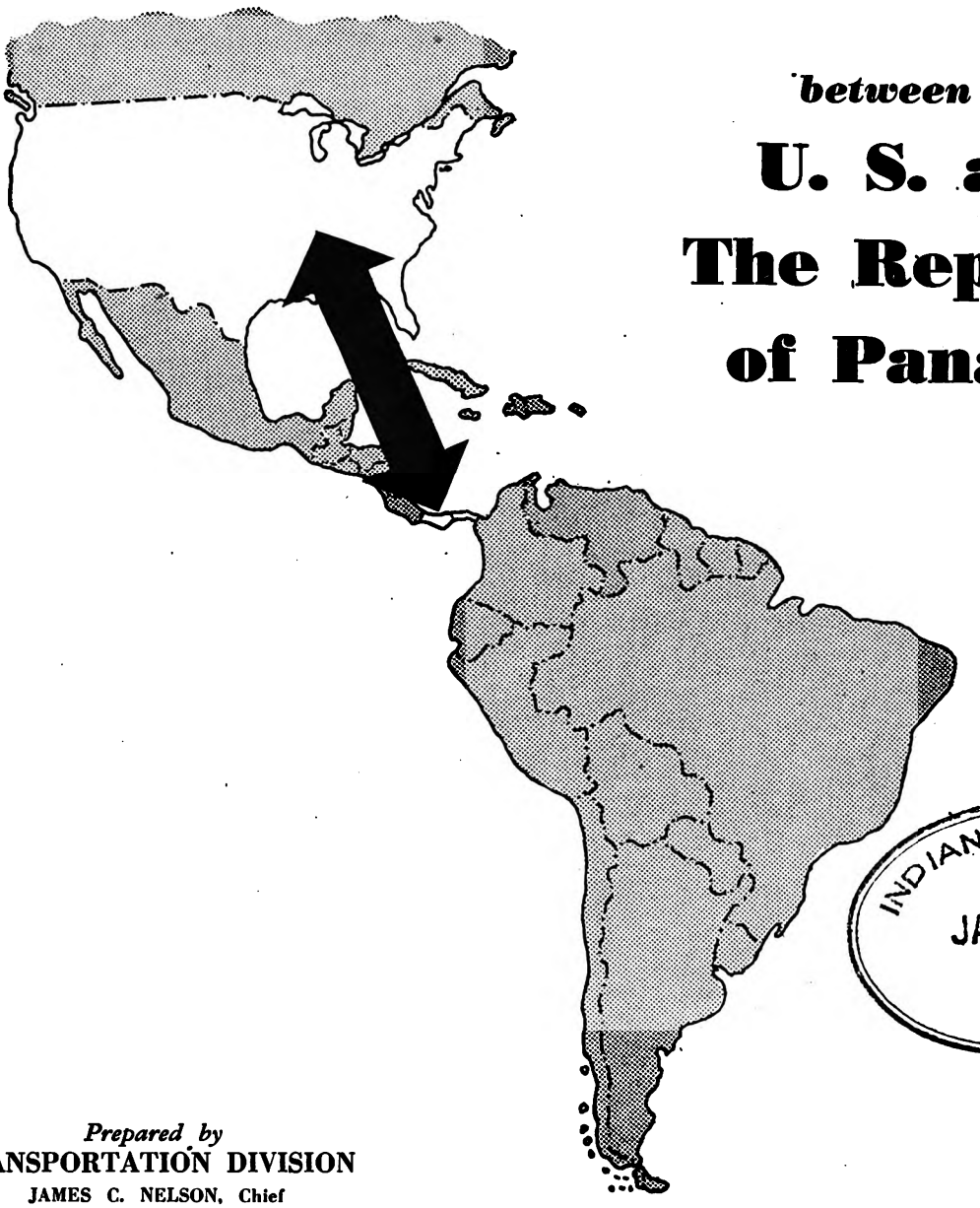
Office of Domestic Commerce, H. B. McCOY, *Director*

Part 1. TRANSPORTATION and PUBLIC UTILITIES

Available in Parts Covering Selected Services and Commodities
Annual Subscription $1.50. Price this report 5 cents
For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., or any of the Department's Field Offices

Volume 4—Part 1 December 1946 D 17417 Number 25

AIR-CARGO POTENTIALS



between the

U. S. and The Republic of Panama

INDIANA UNIVERSITY
JAN 16 1947
LIBRARY

Prepared by
TRANSPORTATION DIVISION
JAMES C. NELSON, Chief

Digitized by Google

Air-Cargo Potentials Between the United States and The Republic of Panama

By Anne E. Corbett and M. Virginia Mogg

Countries on which reports of this series have been issued to date include Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador, Guatemala, Honduras, Mexico, Paraguay, Peru, Union of South Africa, Uruguay, U. S. S. R., and Venezuela.

The Republic of Panama, located on the isthmus which joins North and South America, covers an area of 29,072 square miles and has a coast line of 447 miles on the Caribbean and 767 miles on the Pacific. Two mountain ranges extend the length of the country and are flanked by coastal plains.

The climate except in the mountainous regions is tropical and the rainfall is heavy. The so-called wet season extends from May through the middle of December.

The Canal Zone divides the country into nearly equal parts, that territory west of the Zone being the more important commercially and the home of the majority of the population. According to the census of 1940, the population of the Republic was 566,677, approximately one-fourth living in the two principal cities, Panama and Colon.

The Republic of Panama is primarily a commercial country, as much of its economy is concerned with the sale of goods and services to the Canal Zone.

Agriculture is next in economic importance, though it employs only a small portion of the population and of the country's land area. The leading agricultural products are bananas, coconuts, coffee, cacao, rubber, abaca, corn, rice, sugarcane, and a variety of tropical fruits and vegetables. Cattle raising is an important activity in Panama. The forest resources of the Republic are extensive and include more than 50 species of wood, besides numerous other forest products. Products of the adjacent waters, including seafood, mother-of-pearl shells, pearls, and sponges, are another source of income.

Though many minerals are found in Panama, only gold is mined on a commercial basis. The few manufacturing industries produce principally light consumer goods such as alcoholic beverages, soft drinks, sugar, foodstuffs, ready-made clothing, ceramic products, furniture, shoes, and lumber.

The principal exports of the Republic of Panama are bananas, cacao, beans, fresh beef, gold, coconuts, and rubber. The principal imports consist mainly of manufactured products and foodstuffs, including automobiles, meats, petroleum products, and piece goods of cotton, silk, and rayon. The United States receives by far the greatest part of Panama's exports and is the dominant supplier of that country's imports.

Though internal air-transport operations have not been extensively developed, plans for the immediate future include connections with remote areas as well as with areas now covered by surface facilities. The Republic at present receives scheduled air service to the United States over the routes of Pan American World Airways. In addition, several other United States air carriers have recently been authorized to render such service. Its location makes it a highly important air terminal for North and South American routes.

Background of Series

The appendix contains an explanation of the purpose of this series of reports on air-cargo potentials and gives a description of the criteria applied in selecting the commodities classified as potentials. It is suggested that readers consult that appendix for the methods used and for factors to be considered in formulating conclusions based on the data contained in any individual report of the series.

In all cases, it should be noted that the statistics in the reports refer to air-cargo "potentials" and not to predictions of the cargo that *will* move by air in the future or to data of cargo that actually was carried by air in 1939. Failure to observe this fact has led to misinterpretation of the figures in the reports on some occasions.

Particular attention should be given to the bases for selection of commodities according to the following categories: Fragility, perishability, and style or obsolescence characteristics. In making these studies, all commodities falling within these categories have been treated as air-cargo potentials, regardless of value per pound. However, an analysis of the value per pound of individual commodities should nevertheless be made to determine whether all the items included can properly be considered as potential air cargo under the cost, competition, and equipment conditions of the immediate future.

For instance, it is unlikely that such cargo as bananas will be shipped in volume by air in the near future because of their low value per pound. The same consideration might apply to grapes and pears which also have low values per pound, or to such low-priced export items as lard and dynamite (classified as perishable and fragile, respectively). All these commodities, however, have been included in their respective categories for the sake of statistical completeness.

Attention is called also to the grouping of commodities by value. These studies, aside from the three special groups, include only articles valued at $0.50 or more per pound. While the higher-valued articles probably would make up the major portion of the air cargoes, especially during the early development of this trade, values as low as $0.25 per pound are being considered in similar studies as indicating potential air cargo, and some cargo with as low or lower values per pound actually does move by air under present conditions.

Potential Air-Cargoes

Table 1 summarizes potential air-cargo trade between the United States and the Republic of Panama in relation to total trade in 1939 (see also chart I).

The total trade between the United States and the Republic of Panama in 1939 was valued at $16,258,134. The value of United States exports in that year, which amounted to $12,674,806, was approximately three and a half times greater than that of imports. In lesser degree, a similar unbalance is evident in the values of export and import commodities selected as air-cargo potentials. In terms of weight, on the other hand, the air-cargo potentials showed a reverse unbalance; this resulted principally from the inclusion of bananas, a low-valued bulky perishable import.

Export Commodities

Export commodities selected as air-cargo potentials had a total shipping weight of 14,034,533 pounds and a total value of $3,984,769, or an average value per pound of 28 cents. Of these totals, 22 percent of the weight and 74 percent of the value were represented by commodities valued at 50 cents a pound or more. Within this category, the value range of 50 cents to 99 cents per pound accounted for the largest part of the total (73 percent of the weight and 52 percent of the value). Items in this value range exported in largest volume were cigarettes; men's and boys' shirts; rayon or synthetic piece goods; dental creams; proprietary medicinal preparations; calf and kip upper leather; and handbags, pocket books, and purses of materials other than leather.

The $1 to $1.99 per pound value class contained the next largest volume of air-cargo potential exports, amounting to 651,985 pounds, valued at $840,489. Items exported in leading volume of that value class were radio receiving sets; tablets, pills and cap-

Digitized by Google

sules; men's boots and shoes with leather uppers; dresses, skirts, and blouses of rayon and other synthetic textiles; hosiery and socks of rayon; and other synthetic textiles.

The remaining 180,605 pounds with a value of $594,326 in the value classes of $2 a pound and higher made up only 6 percent by weight, though 20 percent by value, of the total potential air-cargo exports valued above 50 cents a pound.

Perishable items with values per pound of less than 50 cents made up approximately 65 percent of the weight and 20 percent of the value of the total potential air-cargo exports. Perishables exported in leading volumes were fresh vegetables (2,125,405 pounds valued at $45,711), lard (1,922,719 pounds valued at $132,704), and fresh or frozen beef and veal (1,284,230 pounds valued at $199,301). Live poultry and biologics, the perishables with values per pound above 50 cents, represented less than 1 percent in weight and value of the total potential air-cargo exports.

Fragile items exported in leading volume had values of less than 50 cents a pound and consisted of unfilled glass containers (805,330 pounds valued at $70,820); eggs, an item also having a perishable characteristic, (794,289 pounds valued at $107,937); table glassware (303,680 pounds valued at $15,184); and tumblers, drinking glasses, and stemware (245,540 pounds valued at $12,277). The principal item with a relatively high value per pound exported in 1939 was radio receiving sets (75,650 pounds valued at $94,563).

Seventy percent of the weight and more than 90 percent of the value of exports possessing style characteristics were valued above 50 cents a pound. Principal export items with style characteristics were wearing apparel and motion-picture film. The wearing-apparel items exported in largest volume were handbags, pocketbooks and purses; dresses, skirts, blouses, and other outerwear of rayon or synthetic textiles; and women's cotton dresses and ensembles.

Import Commodities

Import commodities selected as air-cargo potentials had a total shipping weight of 265,685,254 pounds and a total value of $2,937,373, or an average value of 1 cent per pound. The weight of those valued above 50 cents a pound totaled 5,625 pounds and were valued at $9,466.

Approximately 66 percent of the volume and 60 percent of the value of import items valued above 50 cents per pound were in the value classes $1 to $1.99 per pound. Antiques, works of art, and raw reptile skins were the imports of significant volume in that value range.

Items in the value range of 50 cents to 99 cents a pound made up the next largest volume of imports valued above 50 cents a pound. Books and wearing apparel were the two items in that value class which appear to be most suitable for air shipment.

Imports of the perishable item, bananas, totaled 265,255,409 pounds and were valued at $2,923,857. Imports of plantains totaled 415,375 pounds and were valued at $3,323. Although, as indicated previously such perishable items have been included in this study for the sake of statistical completeness, the extremely low value (1 cent per pound) of these two items makes them unsuited for air shipment, and their inclusion therefore distorts the potential air-cargo picture. They comprise more than 99 percent by weight and value of the imports, included as air-cargo potentials.

Actual Air Shipments

Data on actual air-cargo traffic have been compiled by the Bureau of the Census and are available for certain periods of 1944 and 1945. Table 2 illus-

CHART 1

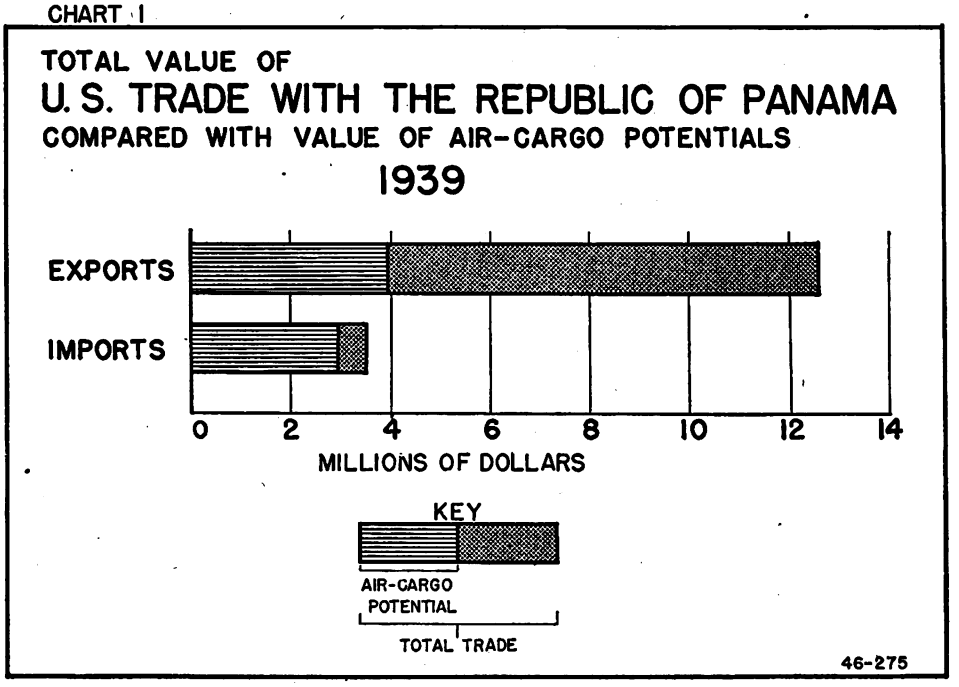
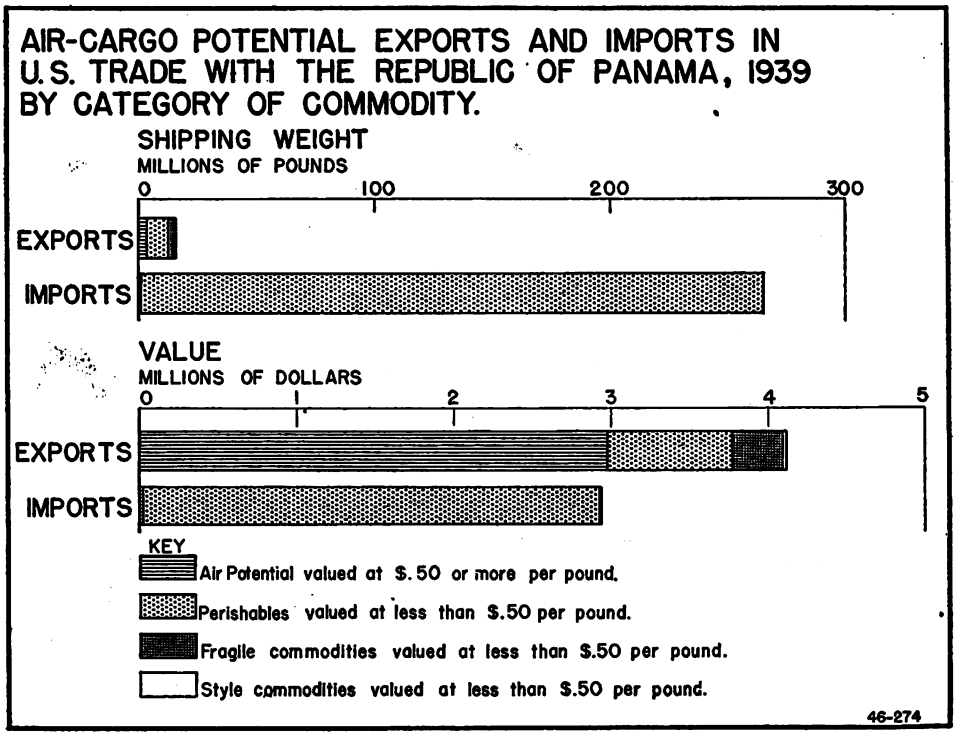


CHART 2



Digitized by Google

trates the value pattern and tables 3 and 4, the leading items in the actual air-cargo movement between the United States and the Republic of Panama. A noteworthy point to be observed from table 2 is that the weight of United States air exports to the Republic of Panama during the single month considered was nearly three times greater than the air imports of the yearly period.

In terms of weight the bulk of United States air exports to the Republic of Panama during August 1944 occurred in the $1 to $1.99 and the $5 to $9.99 value per pound groups. In terms of value, nearly 85 percent of the total was accounted for by items valued above $5 a pound.

A similar pattern is evident for the United States air imports from Panama during the fiscal year 1945 with the $1 to $1.99 and the $5 to $9.99 value classes accounting for more than 92 percent of the total weight, and the latter class alone representing nearly 80 percent of the total value of all air-cargo imports.

Dresses of synthetic materials were exported by air in leading volume from the United States to the Republic of Panama during August 1944. Furniture (valued below 50 cents a pound), motion-picture film, and periodicals were air exports of the next largest volumes. The trade in furniture for 1939 was too low in value per unit for inclusion on the potential air-cargo list.

Aircraft parts were the air-import item of greatest volume during the period covered. However, the volume shown represents a single shipment probably indicating an emergency demand. The air shipments of photographic dry plates and the miscellaneous class of "United States articles returned" occurred regularly throughout the yearly period and may be expected to continue in the future. The majority of the other items were imported by air in small shipments and provide little basis for estimating future demand.

Conclusion

The trade between the United States and the Republic of Panama is characterized by an excess of United States exports to Panama over imports from that country. This great preponderance of exports over imports is evident also in the actual air trade and in the data on potential air-cargo traffic, provided bananas and other items of extremely low value are excluded. This situation suggests the likelihood of a serious return-haul problem.

A favorable factor for the development of air-cargo trade with Panama is its proximity to the United States, which will allow the profitable shipment of some items of relatively low value. Another favorable factor is the importance of the Canal Zone as an international air terminal for routes to and from North and South America.

TABLE 1.—*Air-Cargo Potentials Between the United States and the Republic of Panama in Relation to Total Trade, 1939*

Item	Number of commodities	Shipping weight (gross pounds)	Value
Total United States trade with the Republic of Panama:			
United States exports	1,390	(1)	$12,674,806
United States imports	50	(1)	3,583,328
Total	1,440	(1)	16,258,134
Air-cargo potentials:			
United States exports	485	14,034,533	3,984,769
United States imports	21	265,685,254	2,937,373
Total	506	279,719,787	6,922,142
Percentage of total trade represented by air-cargo potentials:			
United States exports	34.9	(1)	31.4
United States imports	42.0	(1)	82.0
Total	35.1	(1)	42.6

[1] Not available.

SOURCE: Foreign Commerce and Navigation of the United States, Calendar Year, 1939. U. S. Department of Commerce.

TABLE 2.—*Actual Air Traffic Between the United States and the Republic of Panama for Specified Months of 1944 and 1945*

Value per pound	Shipping weight			Value		
	Number of commodities	Gross pounds	Percent of weight	Dollars	Percent of value	Average Value per pound
United States exports (August 1944)						
Less than $0.50	3	1,604	14.2	$275	0.4	$0.17
0.50 to 0.99	5	625	5.6	444	.7	.71
1.00 to 1.99	23	3,256	28.8	4,517	7.4	1.39
2.00 to 2.99	14	1,456	12.9	3,396	5.6	2.33
3.00 to 3.99	8	297	2.6	1,018	1.7	3.43
4.00 to 4.99	5	34	.3	155	.3	4.56
5.00 to 9.99	23	3,103	27.5	22,725	37.3	7.32
10.00 to 24.99	19	712	6.3	11,120	18.2	15.62
25.00 or over	5	203	1.8	17,326	28.4	85.35
Total	105	11,299	100.0	60,990	100.0	5.40
United States imports (July 1944—June 1945)						
Less than $0.50	5	59	1.7	$15	.1	.25
0.50 to 0.99	1	6	.2	3	(1)	.50
1.00 to 1.99	12	1,698	44.7	1,909	13.4	1.12
2.00 to 2.99	19	111	3.0	264	2.0	2.38
3.00 to 3.99	10	42	1.1	146	1.0	3.48
4.00 to 4.99	7	41	1.1	166	1.2	4.05
5.00 to 9.99	22	1,805	47.6	11,317	79.0	6.27
10.00 to 24.99	3	19	.5	230	1.6	12.11
25.00 or over	2	3	.1	239	1.7	7.97
Total	81	3,804	100.0	14,330	100.0	3.77

[1] Less than 0.05 percent.

SOURCE: *United States Exports by Air of Domestic and Foreign Merchandise (Including Lend-Lease Exports)* August 1944 and *General Imports of Merchandise Into the United States by Air*, July 1944–June 1945, Bureau of the Census Department of Commerce.

TABLE 3.—*Principal United States Air Exports to the Republic of Panama,[1] August 1944*

[Arranged in descending order of weight]

Commodity	Shipping weight (pounds)	Value	Value per pound
Synthetic dresses, not knit	2,333	$17,014	$7.29
Wood office store furniture	1,297	201	.15
Motion-picture features, exposed	938	1,560	1.66
Merchandise valued at $10 or less	906	1,039	1.14
Periodicals	770	855	1.11
Wood manufactures	410	856	2.09
Printed matter—lithographs	366	269	.73
Live poultry	304	701	2.30
Cigarette cases, compacts, metal	273	773	2.83
Cotton braid, ribbon	250	50	.20
Miscellaneous articles	208	1,449	6.97
Jewelry, women's except gold	160	2,752	17.20
Photos and blue prints	154	1,061	6.89
Jewelry, men's except gold or platinum	145	2,497	17.22
Cotton dresses and ensembles	145	1,162	8.01
Medicinal chemicals, prescription	103	1,524	14.80
Jewelry, gold or platinum	93	6,349	68.26
Pens, fountain and stylographic, plastic	88	7,744	88.00
Dental metal, precious	4	1,443	360.70

[1] Commodities with a total shipping weight of at least 200 pounds or a total value of at least $1,000 have been included.

SOURCE: *United States Exports by Air of Domestic and Foreign Merchandise, August 1944*, U. S. Department of Commerce, Bureau of the Census.

Data Included in Tables

The following tables give details of the air-cargo potentials itemized and grouped for convenience of reference. Table 5 summarizes, by value groups, items valued at $0.50 and more a pound.

Digitized by Google

Table 6 lists perishables, fragile commodities, and those possessing a style factor. These categories have no lower limit as to value per pound. Tables from 7 through 10 contain itemized lists of the commodities summarized in tables 5 and 6, giving their weight, value per pound, and density.

TABLE 4.—*Principal United States Air Imports from the Republic of Panama,*[1] *Calendar Year 1944*

[Arranged in descending order of weight]

Commodity	Shipping weight (pounds)	Value	Value per pound
Aircraft parts	1,612	$1,800	$1.12
United States articles returned	992	6,429	6.48
Photographic dry plates	764	4,436	5.81

[1] Commodities with a shipping weight of at least 200 pounds or a total value of at least $1,000 have been included.

SOURCE: *General Imports into the United States by Air, Calendar Year 1944*, U. S. Department of Commerce, Bureau of the Census.

TABLE 5.—*Summary of Commodities Valued at $0.50 or More per Pound in United States Trade with the Republic of Panama, 1939*

[Category 1]

Category—Value Per Pound	Commodities			Shipping weight		Value		
	Number	Percent of air-cargo potentials	Percent of of total trade	Gross pounds	Percent of air-cargo potentials	Dollars	Percent of air-cargo potentials	Percent of total trade
EXPORTS								
1—$0.50 to $0.99	192	39.6	13.8	2,235,780	15.9	1,523,780	38.2	12.0
2— 1.00 to 1.99	119	24.5	8.6	651,985	4.6	840,489	21.1	6.6
3— 2.00 to 2.99	46	9.5	3.3	98,575	.7	231,576	5.8	1.8
4— 3.00 to 3.99	21	4.3	1.5	61,000	.4	218,500	5.5	1.7
5— 4.00 to 4.99	8	1.6	.6	1,846	.1	8,492	.2	.1
6— 5.00 to 9.99	18	3.7	1.3	18,026	.1	104,813	2.6	.8
7—10.00 to 24.99	8	1.6	.6	888	.1	16,247	.4	.1
8—25.00 and over	3	.6	.2	270	.1	14,698	.4	.1
Total $0.50 or more	415	85.4	29.9	3,068,370	21.9	2,958,595	74.2	23.2
Total air-cargo potentials [1]	485	100.0	34.9	14,034,533	100.0	3,984,769	100.0	31.4
Total exports to the Republic of Panama	1,390	.....	100.0	(2)	.....	12,674,806	.....	100.0
IMPORTS								
1—$0.50 to $0.99	4	19.0	8.0	1,785	(3)	1,077	(3)	(3)
2— 1.00 to 1.99	4	19.0	8.0	3,730	(3)	5,670	.2	.2
3— 2.00 to 2.99	.....	.....	.....	.....	.....	.....	.....	.....
4— 3.00 to 3.99	1	4.8	2.0	6	(3)	20	(3)	(3)
5— 4.00 to 4.99	.....	.....	.....	.....	.....	.....	.....	.....
6— 5.00 to 9.99	1	4.8	2.0	13	(3)	87	(3)	(3)
7—10.00 to 24.99	1	4.8	2.0	81	(3)	1,961	.1	.1
8—25.00 and over	4	19.0	8.0	10	(3)	651	(3)	(3)
Total $0.50 or more	15	71.4	30.0	5,625	(3)	9,466	.3	.3
Total air-cargo potentials [1]	21	100.0	42.0	265,685,254	100.0	2,937,373	100.0	82.0
Total imports from the Republic of Panama	50	.....	100.0	(2)	.....	3,583,328	.....	100.0

[1] Includes, in addition to commodities valued at $0.50 per pound and over, those commodities valued less than $0.50 per pound, selected because of perishability, fragility, or as possessing a style factor. A commodity which appears under more than one category is accounted for only once in arriving at the total.

[2] Not available.

[3] Less than 0.05 percent.

SOURCE: *Foreign Commerce and Navigation of the United States, Calendar Year 1939*, U. S. Department of Commerce.

TABLE 6.—*Summary of Commodities Possessing Perishability, Fragility, or Style Factor in United States Trade with the Republic of Panama, 1939*

Category (value per pound)	Commodities			Shipping weight		Value		
	Number	Percent of air-cargo potentials [1]	Percent of total trade	Gross pounds	Percent of air-cargo potentials [1]	Dollars	Percent of air-cargo potentials [1]	Percent of total trade
EXPORTS								
Perishable commodities:								
Less than $0.50	38	7.8	2.7	9,091,405	64.8	$821,792	20.6	6.5
$0.50 or more	5	1.0	.4	12,858	.1	20,829	.5	.2
Total	43	8.8	3.1	9,104,263	65.0	842,621	21.1	6.7
Fragile commodities:								
Less than $0.50	32	6.6	2.3	2,636,340	18.8	302,735	8.6	2.4
$0.50 or more	62	12.8	4.5	259,533	1.8	311,626	7.8	2.5
Total	94	19.4	6.8	2,895,873	20.6	614,361	15.4	4.9
Commodities possessing style factor:								
Less than $0.50	4	.8	.3	66,682	.5	20,455	.5	.2
$0.50 or more	22	4.5	1.6	163,660	1.2	284,859	7.1	2.2
Total	26	5.3	1.9	230,342	1.7	305,314	7.6	2.4
IMPORTS								
Perishable commodities:								
Less than $0.50	5	23.8	10.0	265,679,531	100.0	2,927,879	99.7	81.7
$0.50 or more	1	4.8	2.0	1,265	(2)	800	(2)	(2)
Total	6	28.6	12.0	265,680,796	100.0	2,928,679	99.7	81.7
Fragile commodities:								
Less than $0.50	1	4.8	2.0	98	(2)	28	(2)	(2)
$0.50 or more	1	4.8	2.0	4	(2)	200	(2)	(2)
Total	2	9.6	4.0	102	(2)	228	(2)	(2)
Commodities possessing style factor:								
Less than $0.50	.....	.....	.....	.....	.....	.....	.....	.....
$0.50 or more	2	9.6	4.0	19	(2)	107	(2)	(2)
Total	2	9.6	4.0	19	(2)	107	(2)	(2)

[1] See table 5 for data on total air-cargo potentials.

[2] Less than 0.05 percent.

SOURCE: *Foreign Commerce and Navigation of the United States, Calendar Year 1939*, U. S. Department of Commerce.

Digitized by Google

TABLE 7.—*Commodities Valued at $0.50 or More per Pound in United States Trade with the Republic of Panama, 1939*

[Group 1—Commodities valued from $0.50 to $0.99 per pound]

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	EXPORTS				
0019	Poultry, live	2,561	$2,195	$0.86	(1)
0099	"Other" edible animal products [2]	8,904	4,630	.52	(1)
	Upper leather (except patent):				
0300	Cattle side, grain, black	7,539	6,015	.80	av. 18
0301	Cattle side, grain "other"	18,682	10,985	.59	av. 21
0302	Cattle side, finished splits	4,833	2,976	.62	av. 21
0305	Calf and kip, "other"	35,632	28,228	.79	av. 18
0307	Sheep and lamb	5,677	4,374	.77	av. 21
0311	"Other" upper leather [2]	2,441	1,461	.60	av. 21
0319	"Other" patent upper leather	407	338	.83	10
0321	Lining leather, sheep and lamb	10,185	7,915	.78	31
0323	"Other" lining leather	894	840	.94	31
0328	Boot and shoe cut stock, other than outer soles	1,690	862	.51	18–30
0600	Leather welting	5,310	3,292	.62	17
	Boots, shoes, and other footwear with leather uppers:				
0646	Youths' and boys' boots and shoes	3,988	2,442	.61	av. 14
0648	Infants' and children's boots and shoes	4,711	4,150	.88	9
0650	Slippers for housewear, all leather	1,885	1,497	.79	9
0656	Boots, shoes, and other footwear, with uppers of material other than leather	3,650	2,418	.66	av. 12
0659	Discontinued models, old styles, and second-hand shoes	86	54	.63	av. 12
0689	Women's and children's handbags, pocketbooks, and purses of materials other than leather	34,907	23,056	.66	5–9
0659	Luggage and related articles	6,720	6,229	.93	av. 7
0697	Belts to be worn on the person	20,955	18,231	.87	8
0699	"Other" leather manufactures	3,721	3,312	.89	(1)
2036	Rubber soles	3,026	1,893	.63	32
2042	Druggists' rubber sundries other than water bottles and fountain syringes	11,455	9,737	.85	13
2045	Rubber thread	784	634	.81	34
2046	Rubber toys and balls	2,145	1,566	.73	18
2620	Cigars and cheroots	10,719	10,672	.99	av. 23
2622	Cigarettes	759,389	453,150	.60	22
3012	Cotton yarn, mercerized, all kinds for manufacturing	460	315	.68	21
3013.2	Cotton yarn, combed, finished, except mercerized, for manufacturing	187	113	.60	16–23
3015	Cotton sewing thread	16,701	11,066	.66	21–34
3036	Tobacco and cheesecloth 36x32 count and lower construction	160	114	.71	13
3049.2	Carded broadcloth, printed	11,653	5,826	.50	20–25
3050	Cheesecloth and gauzes, bleached or dyed (full pieces)	90	84	.93	17
3052.1	Printcloth, dyed in the piece	13,206	7,010	.53	35
3055.1	Cotton flannels, bleached or colored	5,709	3,237	.57	15
3067	Voiles, organdies, lawns, and batiste, combed	17,693	13,171	.74	av. 10
3073	Marquisettes, combed	2,466	2,065	.84	av. 10
3074	"Other" combed and fine carded goods	13,905	7,078	.51	10–18
	"Other" cotton fabrics:				
3082	Table damask in the piece	935	561	.60	25–33
3084	Tapestries and other upholstery goods	4,124	2,141	.52	13–21
3087	Plushes	450	278	.62	av. 15
	Cotton wearing apparel:				
3096	Underwear, men's and boys'	29,718	23,656	.80	av. 12
3097	Underwear, women's and children's	7,852	5,617	.72	11
3098	Nightwear, women's and children's [2]	1,837	1,057	.58	av. 7
	"Other" cotton wearing apparel:				
3114	Overalls, breeches, pants, aprons, and men's work clothing	5,207	4,705	.90	25
3115	Nightwear, men's	6,114	5,987	.98	av. 7
3116.1	Underwear, men's athletic, (not knit)	22,851	17,042	.75	13
3117.1	Work shirts	13,077	8,534	.65	10
3117.2	"Other" men's and boys' shirts (except knit)	159,795	159,303	.99	10
3122	Women's dresses and ensembles	19,984	19,754	.99	av. 11
3124	Women's and children's underwear and nightwear (not knit)	14,356	10,409	.73	13
3160	Cotton braids, trimmings, bindings, lacings, tape-labels, and webbing	6,367	5,476	.86	15
3161	"Other" narrow fabrics [2]	3,476	1,912	.55	15
3175	Cotton bedspreads, candlewick, chenille and tufted	6,047	5,646	.93	av. 14
3178	Cotton bed sheets and pillow cases	17,338	8,769	.51	20–32
3181	Cotton curtains and draperies	604	423	.70	8
3189	"Other" house furnishings [2]	611	342	.56	(1)
3399	Flax, hemp, and ramie manufactures	12,648	12,142	.96	(1)
3643	Mohair cloth	108	84	.78	12
3649	"Other" wool fabrics	2,162	1,423	.66	16
3665	Wool felts	2,877	1,444	.50	av. 18
3699	"Other" hair manufactures	2,920	1,489	.51	(1)
3845	Piece goods, wholly or chiefly rayon and other synthetic fibers, pile (velvets, etc.)	6,093	5,876	.96	21
3849.1	Piece goods, wholly or chiefly rayons, and other synthetic fibers: other woven fabrics	100,780	71,310	.71	31
3850	Rayon, house furnishings	434	387	.89	(1)
3858.5	Braid, fringes and narrow trimmings of rayon and other synthetic textiles	1,746	1,554	.89	12
3915	Pyroxylin coated or impregnated fabrics	4,588	2,350	.51	34
3917	"Other" coated or impregnated fabrics [2]	7,160	4,006	.56	24
3918	Waterproof outer garments	3,668	2,547	.69	av. 12
3940	Hat braids, strips and sheets of natural fibers of synthetic textiles	340	238	.70	14
3958	"Other" hats, caps and berets of woven fabrics	8,902	5,670	.64	10–15
4302	Cork manufactures—disks, washers, and wafers	102	53	.52	9–12
5292	Glass electric insulators	292	151	.52	30
5419	"Other" artificial abrasives, hones, whetstones, etc.	739	389	.53	29–34
5455.5	Asbestos packing	2,968	1,578	.53	23–56
	Carbons and graphite products:				
5474	Brushes and stock	790	395	.50	29
5478	Lighting carbons	1,754	1,497	.85	43–81
6035.5	Steel sheets, block, ungalvanized, stainless steel	1,148	686	.60	93–162
6115	Table cutlery, including forks	4,191	2,639	.63	30
6116	Butchers' and kitchen knives, forks, cleavers and steels	951	713	.75	50
	Cooking and heating stoves (except electric):				
6145	Kerosene room and water heaters	720	432	.60	av. 10
6146	Gasoline stoves and room and water heaters	176	165	.94	9
6150	Domestic oil burners	406	211	.52	6
6151	Industrial oil burners	698	450	.64	6–61
6154	Hacksaw blades	1,483	1,004	.68	135
6156	Crosscut, hand back, and other saws [2]	3,317	1,990	.60	21–30
6157.1	Augers, bits, gimlets, gimlet bits, and counter sinks, woodworking	452	274	.61	40–100
6169	Hand-operated pipe stocks and dies, die stocks, dies and bushings	807	589	.73	53–120
6170	Hand-operated pipe cutters and other metal cutting tools [2]	1,609	901	.56	53–120
6173	"Other" pliers, nippers, and splicing clamps	701	498	.71	50–90
6178.9	"Other" hand tools and parts	15,525	15,370	.99	28–141
6180	Door locks and lock sets of iron, steel, brass and bronze	17,043	8,744	.51	46
6458	Brass wood screws (whether or not plated)	1,780	1,310	.74	52–61
6469	"Other" hardware of brass or bronze	3,371	1,888	.56	166
6620	Babbitt metal	2,562	1,393	.54	10–90

See footnotes at end of table.

Digitized by Google

TABLE 7.—*Commodities Valued at $0.50 or More per Pound in United States Trade with the Republic of Panama, 1939*—Continued

[Group 1—Commodities valued from $0.50 to $0.99 per pound]

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	EXPORTS—continued				
			$	$	
6635	Quicksilver or mercury	145	140	0.97	172–800
6670	Type	1,556	1,014	.65	93
6958	Silver-plated ware, knives, forks and steak sets	4,355	3,310	.76	17–43
6969	Silver-plated ware, "other"	7,628	6,179	.81	17–43
7011	Self-contained lighting outfits	12,453	6,351	.51	(1)
7019	Capacitors ½ kilowatt ampere and larger	583	379	.65	120–160
7021.1	Rotating converters under 300 kilowatts	38	26	.68	51
7028	Complete battery chargers, nonrotating	1,076	581	.54	15–26
7031	Switchboard panels, except telephone	4,802	2,545	.53	4–24
7034	Fuses	4,533	3,037	.67	22
7035	Watt-hour and other measuring meters	10,596	9,007	.85	37–64
7048	Starting and controlling equipment for industrial motors and parts	6,052	3,026	.50	(1)
7049	Starting and controlling equipment for electric railway and vehicle motors and parts	693	374	.54	(1)
7056	Portable electric tools	2,619	1,807	.69	24–140
	Electrical appliances:				
7060	Flashlight cases	11,793	6,486	.55	10
7064	"Other" metal filament lamps	32,651	21,876	.67	5–12
7065	"Other" electric lamps	3,296	1,648	.50	4–12
7069.1	Electric domestic vacuum cleaner parts	781	414	.53	8–33
7073.5	"Other" domestic electric utensils	4,418	2,253	.51	6–11
7075.5	"Other" X-ray apparatus and parts	16,056	12,684	.79	14–60
7089	Bells, buzzers, annunciators and alarms	426	396	.93	24
7095	Sockets, outlets, fuse blocks, lighting switches and parts	8,144	6,678	.82	20
7142	Stationary and portable internal combustion engines, Diesel and semi-Diesel	29,091	16,000	.55	av. 95
7311	Rock drills	10,071	6,647	.66	16–157
	Power-driven metalworking machinery:				
7406	Thread-cutting and automatic screw machines	655	360	.55	26–35
7408	"Other" milling machines	144	75	.52	47
7443	"Other" metal grinding machines and parts	725	551	.76	31–49
7455	"Other" power-driven metalworking machinery and parts	2,868	1,520	.53	18–49
	"Other" metalworking machinery:				
7458	"Other" portable and hand-or-foot operated metalworking machines and parts	2,347	1,385	.59	15–69
7471	Chucks for machine tools	96	89	.93	42–78
7552	Sewing machines for factory or industrial use	12,295	7,377	.60	5–37
7691	Ball bearings and parts, except balls	536	418	.78	50–120
7692	Roller bearings and parts, except rollers	588	453	.77	50–120
7760	"Other" accounting and calculating machines including used and rebuilt	76	75	.99	13–28
7763	Duplicating machines, parts and supplies for	3,735	2,129	.57	13–20
7767	Cash register parts	544	533	.98	23
	Typewriters:				
7770	Standard, new	17,151	14,235	.83	19
7772	Portable, new	4,641	3,806	.82	24
7774.1	Rebuilt	3,675	2,058	.56	20
7774.9	"Other" used	100	63	.63	20
	Printing and bookbinding machinery:				
7790	Typesetting machines	7,566	4,615	.61	av. 23
7795	"Other" printing and typesetting machinery, parts and accessories	7,475	4,859	.65	23–55
7802	"Other" dairy equipment and parts, for farm use	1,572	1,006	.64	10–22
7916	Automotive piston rings	876	718	.82	24
7921	Spark plugs	1,478	1,360	.92	av. 49
7954	Motorcycles part and accessories (except tires)	2,349	1,480	.63	(1)
7958	Diesel and semi-Diesel internal combustion marine engines	3,105	2,701	.87	27–47
7970	Railway signals, attachments and parts	6,646	3,788	.57	(1)
8069	"Other" finished coal-tar products	478	248	.52	18–58
8120	Biologics for animal and veterinary use	5,045	4,440	.88	(1)
8130	Medicinal and reagent chemicals	14,345	10,615	.74	23
8149	Corn and foot remedies	1,013	800	.79	14
8152	Salves and ointment for burns, cuts, skin diseases, insect bites, inflamation, etc.	6,963	4,665	.67	33
8180	"Other" proprietary medical preparations	65,148	37,786	.58	30–45
8200	Nicotine sulphate (40 percent basis)	114	87	.76	34
8265	Cellulose acetate sheets, rods or tubes, and other unfinished forms	73	48	.66	14–50
8267	Cellulose acetate plastic film support	240	190	.79	(1)
8381	Tin compounds	1,695	966	.57	35–95
8734	Dental cream	75,337	48,652	.65	31
8742	Face and compact powder	24,559	14,244	.58	19–50
8757	"Other" cosmetics	1,980	1,465	.74	av. 30
8766	Perfumery and toilet water	3,951	3,832	.97	25
9003	Cameras, other than motion-picture box-type (set focus)	2,905	1,944	.67	17–40
9008.1	Substandard gage (less than 35 mm.). silent motion-picture projectors	3,845	2,817	.73	20–28
9011	Reproducing motion-picture sound equipment	6,738	6,334	.94	av. 11
	"Other" sensitized films, not exposed:				
9125	Cartridge or rolls	31,508	26,099	.83	26
9126.9	Packs of sheets, "other"	6,515	5,431	.83	23–41
9129	Photographic paper	27,286	14,457	.53	20
9140	"Other" photographic apparatus and supplies	21,353	16,442	.77	av. 27
9155	"Other" dental equipment and supplies	5,427	3,419	.63	8–62
9245	Percussion instruments	323	300	.93	2–14
9293	String instruments	139	87	.63	2–6
9295	"Other" musical instruments	212	210	.99	2–27
9297	Musical instrument parts and accessories [2]	4,731	2,555	.54	8–18
9319	"Other" penholders and parts	130	69	.53	14
9392	Carbon paper	6,006	3,179	.53	36
9422	"Other" fishing tackle and parts	2,674	1,925	.72	av. 30
9434	Foot, basket, base, tennis and other balls	2,447	2,276	.93	9–30
9472	Rifles	379	218	.58	26–30
9490	Shot shells	3,625	3,348	.92	76
9491	Metallic cartridges	2,730	1,623	.59	130
9565	Playing cards	11,880	5,892	.50	48
9570	Clocks, electric	1,722	1,024	.59	16
	Clocks [2], (except electric):				
9571	1-day alarm clocks	4,624	4,061	.88	26–40
9572	Mantel, novelty, and wall clocks	361	186	.52	26–40
9591	Time recording devices and parts	153	119	.78	(1)
9793	Gasoline pressure lamps, lanterns and parts	364	204	.56	3–22
9810	Synthetic resin products—laminated sheets, plates, rods, tubes and other unfinished forms	17	9	.53	(1)
9819	Manufactures of cellulose acetate [2]	25	17	.68	(1)
9820	Manufactures of all other compounds of cellulose [2]	2,080	1,560	.75	(1)
9826.1	Household brushes	2,325	1,473	.63	13
9827	Combs	463	355	.77	24
9830	Plates and cuts, electrotypes, stereotypes, half-tone, lithographic or engraved	185	147	.79	12–34
9831	Umbrellas and parasols	13,538	10,500	.78	av. 26

See footnotes at end of table.

Digitized by Google

TABLE 7.—*Commodities Valued at $0.50 or More per Pound in United States Trade with the Republic of Panama, 1939*—Continued

[Group 1—Commodities valued from $0.50 to $0.99 per pound]

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	EXPORTS—continued				
9860	Trunks	9,550	$5,164	$0.54	4–11
9870	Coin-operated phonographs	9,600	5,103	.53	17–24
	Total	2,235,780	1,523,780	.68	
	IMPORTS				
0840.0	Male horses for breeding	1,265	800	.63	(1)
3113.9	"Other" wearing apparel	40	29	.73	7–22
3840.16	Manufactures of rayon or other synthetic textiles—not knit or crocheted [3]	129	69	.53	10
9510.52	"Other" books, [2] not of bona fide foreign authorship	351	179	.51	(1)
	Total	1,785	1,077	.60	

See footnotes at end of table.

[Group 2—Commodities valued from $1 to $1.99 per pound]

	EXPORTS				
0094	Meal extracts and bouillon cubes	41	$ 48	$1.17	34–57
	Upper leather (except patent):				
0304	Calf and kip, black	6,106	10,354	1.70	av. 18
0308	Goat and kid (glazed kid), black	4,324	7,581	1.75	av. 21
0309	Goat and kid (glazed kid) "other"	6,237	8,410	1.35	av. 21
0310	Horse and colt	11	14	1.27	av. 21
	Patent upper:				
0312.1	Cattle	11,239	14,993	1.33	10
0313	Goat and kid	75	78	1.04	10
0336	Glove and garment leather of sheep and lamb	392	399	1.02	19
0353	Upholstery and automobile leather	414	559	1.35	24
0357	Reptilian and aquatic leather for all purposes	110	141	1.28	18–30
0645	Mens' boots and shoes with leather uppers	46,595	51,073	1.10	14
0672	Leather gloves and mittens	264	486	1.84	12–28
0680	Leather belting, new	2,169	3,149	1.45	37
0688	Womens' and childrens' handbags, pocketbooks and purses of leather	3,644	3,827	1.05	5–9
0698.9	Leather wearing apparel	301	467	1.55	8
0929	Feathers, dressed and manufactures of feathers	867	936	1.08	6–29
2039	Rubber gloves and mittens	369	521	1.41	12
2047	Bathing caps	155	181	1.17	8
2279	"Other" natural essential and distilled oils	895	1,031	1.15	21–42
2280	Blended compounded, or mixed perfume flavor	895	1,131	1.26	24
3016	Crochet, darning and embroidery cotton	4	4	1.00	11
3088	"Other" pile fabrics	134	207	1.54	10–21
	Cotton wearing apparel:				
3090	Handkerchiefs	4,485	5,401	1.20	av. 15
3093	Hosiery, women's	3,462	4,050	1.17	av. 18
3094	Hosiery, children's	8,767	13,052	1.49	av. 13
3095	Hosiery, men's	10,891	12,781	1.17	av. 15
3099.5	Women's and children's	748	1,038	1.39	av. 7
3099.9	"Other" knit outerwear [2]	13,157	13,170	1.01	7–22
	"Other" cotton wearing apparel:				
3120	"Other" men's and boys' clothing of woven fabrics [2]	8,995	10,202	1.13	10–22
3127	Children's outerwear not knit	3,507	6,018	1.72	6–22
3129	"Other" women's and children's apparel of woven fabrics [2]	9,445	11,523	1.22	6–22
3173	Cotton quilts, comfortables and quilted bed pads	344	404	1.17	av. 13
3633	Wool yarns	325	370	1.14	13
3642	Wool cloth and dress goods	9,038	13,645	1.51	12–16
	Wool wearing apparel:				
3679	"Other" knit goods	2,050	2,173	1.06	10
3680	Men's and boys' overcoats, suits and pants	14,045	21,247	1.51	av. 17
3681	Women's and children's wool clothing	1,626	2,717	1.67	16
3689	"Other" wool or mohair manufactures	1,473	1,561	1.06	(1)
3719	Sewing embroidery, and crochet silk	73	107	1.47	16–19
	Fabrics, wholly chiefly silk:				
3720	Broad silks	3,924	4,688	1.19	22
3725	Velvets, plushes, and chenilles	34	34	1.00	10–21
	Silk wearing apparel:				
3741	Underwear	11,297	12,994	1.15	8–16
3757	Hosiery, men's socks	3,884	5,969	1.54	av 12
3849.1	Piece goods, wholly or chiefly rayon, and other synthetic fibers, knit fabric in the piece	263	374	1.42	4
	Rayon and other synthetic textiles:				
3852	Dresses, skirts, blouses, and other outerwear not knit or crocheted	41,417	79,619	1.92	10
3853.1	Knit or crocheted dresses and ensembles	908	1,505	1.66	10
3854	Hosiery, women's and children's	20,548	25,627	1.25	av. 13
3856	Hosiery, men's socks	20,094	21,532	1.07	av. 13
3857.1	Knit underwear	20,508	25,567	1.25	av. 10
3857.2	Woven underwear	16,236	22,005	1.36	av. 12
3858.1	Ribbons	2,435	3,506	1.44	12
3859	"Other" synthetic textile manufactures	7,532	8,888	1.18	(1)
	Hats and hat bodies of straw, palm leaf, etc.:				
3942	Harvest	192	235	1.22	3–10
3944	"Other" sewed	2,688	3,061	1.14	3–10
3945	"Other" woven	2,889	3,445	1.19	3–10
3953	Wool-felt hats	7,734	13,461	1.74	3–10
3957	"Other" hats, caps and berets, knit	271	287	1.06	10–15
3963	Artificial or ornamental flowers, fruits, vegetables, etc	806	854	1.06	3–6
3994	Garters, arm bands, suspenders, and braces	3,391	3,561	1.05	av. 17
4220	Veneers	92	124	1.35	6–7
5217	Laminated glass and manufactures	291	355	1.22	64–80
5513	Mica—manufactured and manufactures of, other	59	69	1.17	(1)
6112	Safety razors	979	1,625	1.66	38
6167	Drills, reamers, and counter sinks, metal cutting	467	808	1.73	30–65
6179	Padlocks of iron, steel, brass and bronze	1,800	2,543	1.41	54–96
6181	Cabinet and other locks of iron, steel, brass and bronze	1,487	2,294	1.54	21
7036	Electrical indicating instruments	1,670	2,990	1.79	5–17
7038	"Other" electrical testing apparatus and parts	2,094	2,115	1.01	(1)
7063	Electric incandescent lamps for automobiles, flashlights and Christmas trees	3,046	3,960	1.30	5–12
7075.9	"Other" therapeutic apparatus and parts	1,805	2,003	1.11	(1)
	Radio apparatus:				
7077	Receiving sets	75,650	94,563	1.25	7–29
7079	Receiving set components	6,297	9,320	1.48	11–36
7081	"Other" receiving set accessories	1,983	2,459	1.24	(1)
7082	Telegraph apparatus and parts	452	624	1.38	24

See footnotes at end of table.

Digitized by Google

TABLE 7.—*Commodities Valued at $0.50 or More per Pound in United States Trade with the Republic of Panama, 1939*—Continued

[Group 2—Commodities valued from $1 to $1.99 per pound]

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	EXPORTS—continued				
7083	Telephone instruments	898	$1,689	$1.88	50
7087	Telephone equipment and parts other than instruments	9,600	9,888	1.03	10–60
7159	Internal combustion accessories and parts	26,433	26,433	1.00	av. 45
7457	Pneumatic portable tools	614	651	1.06	24–140
7485	"Other" metalworking machine tools and parts	105	138	1.31	15–69
7553	Sewing-machine parts	5,845	10,287	1.76	39
7644	Bottling, bottles-washing, and bottle labeling machinery and parts	12,135	13,591	1.12	8–27
7759	Card-punching, sorting and tabulating machines	8,194	12,700	1.55	16
7761	Parts for accounting and calculating machines	1,484	2,077	1.40	23
7764	New cash registers	10,061	12,576	1.25	17–31
7775	Typewriter parts	1,201	1,393	1.16	22
7779	"Other" office appliances and parts	2,505	2,831	1.13	(1)
7949	Aircraft parts and accessories [2]	2,151	3,291	1.53	1–12
7959	"Other" internal combustion marine engines	2,709	3,251	1.20	22–30
8059	Coal-tar colors, dyes, stains and color lakes	1,376	1,861	1.35	18–58
8119	Vitamine and vitaserols	625	1,018	1.63	(1)
8127	Tablets, pills, capsules, powders, ointments, and similar manufactures	54,816	56,460	1.03	25
8155	Asthma, catarrh and hayfever preparations, including inhalants	2,331	2,448	1.05	30–45
8167	Headache, neuralgia and pain remedies	3,432	3,912	1.14	30–45
8755	Rouges	2,464	2,982	1.21	30
9001	Motion-picture cameras—substandard gage (less than 35mm.)	2,788	5,256	1.89	36
9007	Standard gage (35 mm.) motion-picture projectors	181	352	1.94	av. 11
9010	Motion-picture sound-recording equipment	18	27	1.50	(1)
	Motion-picture films, sensitized, not exposed:				
9115	Positive film, 1 inch or more in width	18	31	1.72	av. 40
9116	Negative film, 1 inch or more in width	1,641	2,874	1.75	av. 40
	Exposed motion picture films:				
9121.5	Negative newsreels (less than 4,000 linear feet)	89	161	1.81	av. 40
9123.5	Positive newsreels (less than 4,000 linear feet)	893	1,749	1.96	av. 40
	"Other" sensitized films, nor exposed—packs of X-ray sheets	11,665	17,099	1.47	23
9143	Spectacles, eye glasses, goggles, lenses, [2] and frames	5,217	7,200	1.38	11–41
9156	Sterilizers	2,172	3,365	1.55	6–21
9157	Surgical and medical instruments	11,007	14,529	1.32	21
9160	Surveying and engineering instruments	1,846	2,418	1.31	18–33
9190	"Other" scientific laboratory and professional instruments and apparatus	11,716	12,653	1.08	3–87
9395	Typewriter ribbons	1,860	2,738	1.47	47
9420	Fishing rods	52	95	1.83	14–23
9433	Golf balls	355	663	1.87	18–33
9436	Golf clubs	966	1,502	1.55	(1)
9579	"Other" clocks and parts	274	362	1.32	17–48
9629	"Other" articles of other materials	163	274	1.68	(1)
9711	Buttons of cellulose compounds, galalith and other plastics	1,899	3,287	1.73	41
9713	Button parts, backs, blanks or molds	976	1,103	1.13	6–38
9791	Incandescent mantels, except electric	14	18	1.29	9
9824	Toilet brushes, other than toothbrushes	995	1,001	1.01	5–16
9825	Paint brushes, except industrial	1,763	2,548	1.45	25
9828	Tobacco pipes (of all materials)	1,543	1,594	1.03	13
	Total	651,985	840,489	1.29	.....
	IMPORTS				
0295.0	Raw reptile skins	604	928	1.54	(1)
3912.6	Unfinished hats, palm leaf (Panamas)	14	14	1.00	(1)
9290.71	Cases for musical instruments	8	10	1.25	(1)
9640.9	Artistic antiques, works of art, etc. (except rugs and carpets) produced prior to the year 1830.	3,104	4,718	1.52	(1)
	Total	3,730	5,670	1.52	.....

See footnotes at end of table.

[Group 3—Commodities valued from $2 to $2.99 per pound]

	EXPORTS				
0647	Women's and misses' boots and shoes	6,269	$12,881	$2.05	11
	Card cases, change purses, wallets, and similar articles:				
0692	Of leather	704	1,590	2.26	9
0693	Of materials other than leather	359	802	2.23	9
2058	Combs, finished	314	784	2.50	24
2268	Essential or distilled oils—peppermint	17	37	2.18	21–42
3099.1	Men's and boys' cotton-sweaters, jersey pullovers and sweat shirts	1,103	3,149	2.85	av. 7
3113	Cotton men's and boys' jackets, and windbreakers or corduroy moleskin, leatherette, and sheep lined	34	94	2.76	av. 25
3185	Cotton laces, embroideries, and lace window curtains	2,396	5,342	2.23	8
3662	Carpets and rugs of wool	1,714	3,791	2.21	av. 13
3729	Silk and velvet ribbons	91	215	2.36	12
3742	Silk dresses, skirts, and blouses	1,356	4,050	2.99	10
	Rayon and other synthetic textiles:				
3840	Yarn, single and plied	12	25	2.08	av. 24
3853.2	"Other" knit outerwear	951	2,311	2.43	8–12
3857.7	Sleeping and lounging garments, knit or woven	946	2,168	2.29	8–14
3913	Windowshade cloth	2	4	2.00	52
3921	Corsets, brassieres, and girdles	9,906	22,382	2.26	av. 12
6114	Scissors, shears and snips	162	402	2.48	44
6118	Machine knives	30	88	2.93	174
6155.1	Circular saws	131	278	2.12	34
6630	Nickel chrome electric resistance wire	37	81	2.19	50
7037	Electrical recording instruments	242	633	2.62	25
	Radio apparatus:				
7076	Transmitting sets, tubes and parts	4,145	8,829	2.13	9–36
7078	Radio receiving tubes	1,742	3,501	2.01	9
	Accounting and calculating machines:				
7752	Listing-adding-bookkeeping machines	373	913	2.45	16–24
7753	Typewriter-bookkeeping and billing machines	566	1,290	2.28	15–20
7756	Listing-adding machines	4,299	9,156	2.13	16–34
7757	Calculating machines	1,300	3,769	2.90	16–23
8122	Vaccines for human use	940	2,099	2.87	(1)
8123	Glandular products, organotherapeutics, enzymes, ferments, and cultures media	2,927	6,440	2.20	(1)
8157	Malaria, chill, and fever remedies	6,563	14,242	2.17	30–45
8629	Blasting caps	704	2,045	2.90	36
8756	Lipsticks	3,741	7,482	2.00	av. 30
9005	"Other" cameras, other than motion picture	2,549	5,333	2.09	av. 40

See footnotes at end of table.

Digitized by Google

TABLE 7.—*Commodities Valued at $0.50 or More per Pound in United States Trade with the Republic of Panama, 1939*—Continued

[Group 3—Commodities valued from $2 to $2.99 per pound]

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	EXPORTS—continued				
9113	Motion-picture films, sensitized, not exposed-positive film less than 1 inch in width	55	$ 125	$2.27	av. 40
	Exposed motion-picture films:				
9121.9	Negative, other (less than 4,000 linear feet)	9	20	2.22	av. 40
9123.1	Positive, features (4,000 linear feet or over)	34,031	85,227	2.50	av. 40
9158	Surgical appliances, artificial limbs, crutches, trusses, etc	2,865	6,302	2.20	4–60
9302	Mechanical pencils, of other materials	269	625	2.32	17–30
9310	Fountain and stylographic pens of other materials	638	1,845	2.89	8–28
9610	Paintings, etchings, engravings and statuary	305	649	2.13	(1)
	Jewelry:				
9626	"Other" articles of other metals	633	1,753	2.77	(1)
9627	Men's jewelry of other materials	69	186	2.70	(1)
9628	Women's jewelry of other materials	814	2,394	2.94	(1)
9712	Buttons of other materials	1,010	3,014	2.98	6–38
9813	"Other" synthetic resin products	34	75	2.21	(1)
9826.9	"Other" brushes, including industrial	1,218	2,556	2.10	29
	Total	98,575	$231,576	$2.35	

See footnotes at end of table.

[Group 4—Commodities valued from $3 to $3.99 per pound]

	EXPORTS				
3675	Wool knit bathing suits	3,867	$11,282	$3.92	10
3710	Silk tram, organzine and hard twists	38	125	3.29	16–19
3755	Hosiery, women's full-fashioned silk	36,246	132,158	3.65	av. 11
3759	"Other" silk wearing apparel	2,406	7,988	3.32	8–16
3928	Neckties, cravats, mufflers, and scarfs, of all fibers	3,284	12,771	3.89	av. 22
6168	Hand-operated screw plates, bolt dies, taps, and tap wrenches	120	397	3.31	53–120
6190	"Other" needles	5	15	3.00	37
6197	Precision scales, balances, and weights for laboratory use	71	223	3.14	av. 18
7075.1	X-ray tubes	839	3,245	3.87	2
7099.1	Electric razors	105	333	3.17	16
7946	Aircraft engines	977	3,400	3.48	10–40
7947	Aircraft engine parts and accessories	106	328	3.09	(1)
8121	Serums and antitoxins for human use	1,385	5,055	3.65	(1)
9002.3	Aerial, studio, photo-engraving, coin-operated and similar types of cameras, for professional scientific, or commercial uses	117	395	3.38	17–40
9112	Stereopticians, magic lanterns, and other projection apparatus	1,699	5,912	3.48	(1)
9123.9	Exposed motion-picture films—positive, "other" (less than 4,000 linear feet)	5,195	19,678	3.79	av. 40
9149	"Other" optical goods	2,068	6,658	3.22	(1)
9580	Watches without jewels	1,089	4,153	3.81	av. 46
9635	Jewelry findings, parts and materials	194	703	3.62	(1)
9812	Synthetic resin molded products	25	98	3.92	(1)
9822	Toothbrushes	1,164	3,583	3.08	14
	Total	61,000	$218,500	3.58	
	IMPORTS				
9025.7	Motion-picture film positives prints or duplicates-shorts (less than 4,000 linear feet) Newsreels	6	$20	$3.33	34–74
	Total	6	$20	$3.33	

See footnotes at end of table.

[Group 5—Commodities valued from $4 to $4.99 per pound]

	EXPORTS				
3091.2	Cotton gloves, dress and all other	45	$ 185	$4.11	av. 11
3799	"Other" silk manufactures	419	1,853	4.42	8
6955	Sterling and other solid silverware, knives, forks and steak sets	366	1,759	4.81	17–43
6956	Sterling and other solid silverware, other	496	2,384	4.81	17–43
7482	Milling cutters, machine-operated threading dies and taps and similar machine-operated metal-cutting tools	146	726	4.97	15–69
9008.2	Motion-picture projectors—substandard gage (less than 35 mm.) sound	99	475	4.80	14
9121.1	Exposed motion-picture films—negative, features (4,000 linear feet or over)	35	150	4.29	av. 40
9142	Ophthalmic lenses	240	960	4.00	9–29
	Total	1,846	$8,492	$4.60	

See footnotes at end of table.

[Group 6—Commodities valued from $5 to $9.99 per pound]

	EXPORTS				
2271	Citrus oils	156	$1,080	$6.92	36–40
3711	Spun silk	11	90	8.18	16–19
3754	Silk hosiery, women's and children's seamless	10,665	54,153	5.08	av. 11
3951	Men's and boys' fur-felt hats	226	1,234	5.46	3–10
3952	Women's and girls' fur-felt hats	70	400	5.71	3–6
6189	Sewing-machine needles	175	1,576	9.00	37
6465	Hinges and butts of brass or bronze	125	719	5.75	48–90
7948	Aircraft instruments and parts	75	459	6.12	(1)
9006	Parts of cameras, except lenses	73	438	6.00	(1)
9114	Motion picture films, sensitized, not exposed-negative film, less than 1 inch in width	1,477	9,560	6.47	av. 40
9247	Brass wind instruments	573	3,950	6.89	6–14
9301	Mechanical pencils of plastic materials	254	1,486	5.85	17–30
9309	Fountain and stylographic pens of plastic materials	1,033	8,077	7.82	15
9312	Parts of fountain and stylographic pens	5	35	7.00	8–42
9315	Metallic pen points	91	492	5.41	39–45
9470	Revolvers and pistols	108	766	7.09	av. 42
9621	Men's jewelry of other metals	406	2,204	5.43	(1)
9623	Women's jewelry of other metals	2,503	18,094	7.23	(1)
	Total	18,026	$104,813	$5.81	
	IMPORTS				
9023.0	Motion-picture film negatives, newsreels, undeveloped, made of film of American manufacture and manufactured abroad	13	$ 87	$6.69	41
	Total	13	$ 87	$6.69	

See footnotes at end of table.

Digitized by Google

TABLE 7.—*Commodities Valued at $0.50 or More per Pound in United States Trade with the Republic of Panama, 1939*—Continued

[Group 7—Commodities valued from $10 to $24.99 per pound]

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	EXPORTS				
0753	Fur wearing apparel	7	$125	$17.86	4–6
6997	Gold manufactures [2]	30	528	17.43	(1)
9147	Lenses, not fitted to instruments	125	1,697	13.58	45
9152	Teeth	73	1,325	18.15	(1)
9248	Wood-wind instruments	341	5,756	16.88	6–27
9421	Fishing reels	20	359	17.95	(1)
9581	Watches with jewels	238	5,824	24.47	av. 46
9589	Watch parts	54	638	11.81	25–66
	Total	888	16,247	18.30	....
	IMPORTS				
9503.6	Stamps, foreign postage or revenue and foreign government stamped envelopes or postcards	81	1,961	24.21	8–24
	Total	81	1,961	24.21	.....

See footnotes at end of table.

[Group 8—Commodities valued at $25.00 and over per pound]

	EXPORTS				
6929	Platinum manufactures, except jewelry	1	$ 49	$49.00	(1)
9154	Dental gold and precious metal alloys for dental purposes	223	10,611	47.58	(1)
9620	Jewelry of solid gold or platinum	46	4,038	87.78	(1)
	Total	270	14,698	54.43	.....
	IMPORTS				
6821.5	Platinum sponge and scrap	2	270	135.00	(1)
6845.9	"Other" jewelry—valued over $5 per dozen pieces	1	89	89.00	(1)
9200.0	Violins, violas, violin cellos, and double basses—made in or prior to the year 1800	4	200	50.00	2–6
9919.3	Photographic dry plates and films of American manufacture (except motion-picture films for commercial purposes exposed abroad whether developed or not	3	92	30.67	(1)
	Total	10	651	65.10	.....

[1] Not available.

[2] Not elsewhere specified.

[3] Not specially provided for.

SOURCE: *Foreign Commerce and Navigation of the United States, Calendar Year 1939*, U. S. Department of Commerce.

TABLE 8.—*Perishable Commodities in United States Trade with the Republic of Panama, 1939*

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	EXPORTS				
0010	Cattle for breeding	32,040	$3,625	$0.11	(1)
0019	Poultry live	2,561	2,195	.86	(1)
0020	Beef and veal, fresh or frozen	1,284,230	199,301	.16	25–50
0027	Pork, fresh or frozen	460,577	59,026	.13	25–36
0034	Mutton and lamb	7,006	1,204	.17	25–50
0040	Poultry and game, fresh	207,146	36,832	.18	(1)
0041	Kidneys and livers, fresh	51,302	7,517	.15	25–50
0053	Lard	1,922,719	132,704	.07	av. 36
0059	Oleomargarine of animal and vegetable fats	47,165	4,685	.10	31–54
0060	Fresh and sterilized milk and cream	312	43	.14	47
0065	Butter	627,526	141,897	.23	37
0070	Salmon	475	64	.13	38–52
0071	"Other" fresh fish	36,004	4,137	.11	38–52
0072	Oysters, fresh, in the shell, shucked, frozen, or in ice	15,329	3,765	.24	37
0074	Shrimp, fresh, frozen or in ice	512	88	.17	(1)
0092	Eggs in the shell [2]	794,289	107,937	.13	24
0901	Horses, other than for breeding	11,297	2,050	.18	(1)
0909	"Other" live animals	10,387	3,220	.31	(1)
	Vegetables, fresh:				
1207	Beans	1,296	245	.19	19–48
1209	Peas, green	17,199	1,011	.06	15–23
1210	Peppers	9,320	447	.05	14–23
1213	Tomatoes	88,040	3,817	.04	29–36
1224	"Other" fresh vegetables	2,009,550	40,191	.02	14–48
1256	Yeast	165,430	15,081	.09	22
	Subtropical fruit:				
1302	Grapefruit	16,105	306	.02	34–43
1303	Lemons	21,240	859	.04	30–44
1305	Oranges	93,890	2,859	.03	34–43
	Other fresh fruits:				
1309	Cherries	12,468	1,311	.11	23–42
1313	Berries	23,804	2,840	.12	14–34
1314.1	Watermelons	16,094	247	.02	31
1314.5	"Other" melons	42,274	1,184	.03	31–40
1315	Grapes	449,760	21,194	.05	24–40
1316	Pears	491,383	16,381	.03	35–39
1317	Peaches	26,109	1,392	.05	32–37
1318	Prunes and plums	53,582	2,827	.05	33
1319.1	Apricots	3,249	190	.06	33
1319.9	"Other" fresh fruits	35,300	706	.02	24–40
2535	Flowers, and foliage, cut, fresh, and preserved [2]	396	91	.23	av.20
2599	All other nursery and greenhouse stock [3]	6,600	528	.08	16
	Biologics:				
8120	For animal and veterinary use	5,045	4,440	.88	(1)

Digitized by Google

TABLE 8.—*Perishable Commodities in United States Trade with the Republic of Panama, 1939*—Continued

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	EXPORTS—continued				
8121	Serums and antitoxins for human use	1,385	$5,055	$3.65	[1]
8122	Vaccines for human use	940	2,699	2.87	[1]
8123	Glandular products, organotherapeutics, enzymes, ferments, and culture media	2,927	6,440	2.20	[1]
	Total	9,104,263	842,621	.09	
	IMPORTS				
0086.2	Turtles	7,650	445	0.06	[1]
0840.0	Male horses, for breeding	1,265	800	.63	[1]
0862.5	Birds, [3] live birds valued $5 or less each	61	26	.43	[1]
0906.9	Live animals	1,036	228	.22	[1]
1300.0	Plantains, green or ripe	415,375	3,323	.01	15
1301.0	Bananas, green or ripe	265,255,409	2,923,857	.01	18
	Total	265,680,796	2,928,679	.01	

[1] Not available.

[2] Included also in table 9 (Fragile).

[3] Not elsewhere specified.

[4] Not specially provided for.

SOURCE: *Foreign Commerce and Navigation of the United States, Calender Year 1939*, U. S. Department of Commerce.

TABLE 9.—*Fragile Commodities in United States Trade with the Republic of Panama, 1939*

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	EXPORTS				
0092	Eggs in the shell [1]	794,289	$107,937	$0.13	24
2535	Flowers and foliage, cut, fresh, and preserved [1]	396	91	.23	av. 20
2599	All other nursery or greenhouse stock [1]	6,600	528	.08	16
3963	Artificial or ornamental flowers, fruits, vegetables, etc.	806	854	1.06	3–6
5212	Plate glass	17,733	3,997	.23	64–80
5215	Cylinder, crown and sheet glass	18,346	3,518	.19	45–100
5217	Laminated glass and manufactures	291	355	1.22	64–80
5218	Rolled glass	3,735	658	.18	30–60
5220	Rolled, cylinder, crown and sheet glass, obscured by coloring prior to solidification, not less than ¼ inch in thickness	878	139	.16	30–100
5230	"Other" glass	54,050	11,891	.22	[2]
	Unfilled glass containers:				
5232	Pharmaceutical and proprietary ware including prescription bottles, ampoules and, vials	138,900	8,334	.06	11–26
5234	Beverage bottles, including soda, beer, and alcoholic beverage bottles	223,930	44,786	.20	22–30
5235	Used glass containers of all types	71,650	2,866	.04	22–30
5236	"Other" unfilled glass containers	370,850	14,834	.04	22–30
5237	Tumblers, drinking glasses, and stemware, plain, cut, or engraved	245,540	12,277	.05	12–25
5239	Table glassware, [3] plain, cut, or engraved	303,680	15,184	.05	12–30
5255	Lamp chimneys and lantern globes	15,881	2,144	.14	3–9
5261	Globes and shades for lighting fixtures	27,540	3,415	.12	3–9
5291	Chemical glassware	7,638	3,570	.47	6–9
5292	Glass electric insulators	292	151	.52	30
5299	"Other" glassware	111,020	11,102	.10	[3]
5320	Table and kitchen articles and utensils	13,571	3,476	.26	12–36
6197	Precision scales, balances, and weights for laboratory use	71	223	3.14	av. 18
	Transmission and distribution apparatus:				
7035	Watt-hour and other measuring meters	10,596	9,007	.85	37–64
7036	Electrical indicating instruments	1,670	2,990	1.79	5–17
7037	Electrical recording instruments	242	633	2.62	25
7038	"Other" electrical testing apparatus and parts	2,094	2,115	1.01	[3]
	Electrical appliances (electric incandescent lamps):				
7063	For automobiles, flashlights, and Christmas trees	3,046	3,960	1.30	5–12
7064	"Other" metal filament lamps	32,651	21,876	.67	5–12
7065	"Other" electrical lamps	3,296	1,648	.50	4–12
7067	Flood lights	2,170	868	.40	8–15
7075.1	X-ray tubes	839	3,245	3.87	2
7075.5	"Other" X-ray apparatus and parts	16,056	12,684	.79	14–60
7075.9	"Other" therapeutic apparatus and parts	1,805	2,003	1.11	[3]
	Radio apparatus:				
7076	Transmitting sets, tubes, and parts	4,145	8,829	2.13	9–36
7077	Receiving sets	75,650	94,563	1.25	7–29
7078	Radio receiving tubes	1,742	3,501	2.01	9
7079	Receiving-set components	6,297	9,320	1.48	11–36
7080	Loudspeakers	793	325	.41	13
7081	"Other" receiving set accessories"	1,983	2,459	1.24	[3]
7082	Telegraph apparatus and parts	452	624	1.38	24
7083	Telephone instruments	898	1,689	1.88	50
7092	Starting, lighting, and ignition equipment	3,944	1,696	.43	[3]
7099.1	Electric razors	105	333	3.17	16
7741	Gas meters and parts	25,748	8,497	.33	[3]
7742	Water meters and parts	15,577	7,477	.48	[3]
	Accounting and calculating machines:				
	Listing-adding-bookkeeping machines	373	913	2.45	16–24
7753	Typewriter-bookkeeping-billing machines	566	1,290	2.28	15–20
7756	Listing-adding machines	4,299	9,156	2.13	16–34
7757	Calculating machines	1,300	3,769	2.90	16–23
	Cash registers:				
7764	New	10,061	12,576	1.25	17–31
7766	Used and rebuilt	7,732	2,629	.34	17–31
	Typewriters:				
7770	Standard, new	17,151	14,235	.83	19
7772	Portable, new	4,641	3,806	.82	24
7774.1	Rebuilt	3,675	2,058	.56	20
7774.9	"Other" used	100	63	.63	20
7948	Aircraft instruments and parts	75	459	6.12	[3]

Digitized by Google

TABLE 9.—*Fragile Commodities in United States Trade with the Republic of Panama, 1939*—Continued

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	EXPORTS—continued				
	Explosives:				
8604	Dynamite	54,240	$6,864	$0.13	48
8609	Explosives other than smokeless powder and dynamite	18,850	4,738	.25	30–53
8625	Safety fuses	1,300	363	.28	22–28
8629	Blasting caps	704	2,045	2.90	36
	Cameras:				
9001	Motion-picture substandard gage (less than 35 mm.)	2,788	5,256	1.89	36
9002.3	Aerial, studio, photo-engraving, coin-operated, and similar types of cameras for professional, scientific, or commercial uses	117	395	3.38	17–40
9003	Cameras, other than motion pictures, box type (set focus)	2,905	1,944	.67	17–40
9005	Cameras, other than motion pictures, "other"	2,549	5,333	2.09	av. 40
9006	Parts of cameras, except lenses	73	438	6.00	[2]
	Motion-picture projectors:				
9007	Standard gage (35 mm.)	181	352	1.94	av. 11
9008.1	Substandard gage (less than 35 mm.), silent	3,845	2,817	.73	20–28
9008.2	Substandard gage (less than 35 mm.), sound	99	475	4.80	14
	Motion-picture sound equipment:				
	Recording	18	27	1.50	[2]
	Reproducing	6,738	6,334	.94	av. 11
9112	Stereopticions, magic lanterns, and other projection apparatus	1,699	5,912	3.48	[2]
9142	Ophthalmic lenses	240	960	4.00	9–29
9143	Spectacles, eyeglasses, goggles, lenses, [3] and frames	5,217	7,200	1.38	11–41
9147	Lenses, not fitted to instruments	125	1,697	13.58	45
9149	"Other" optical goods	2,068	6,658	3.22	[2]
9160	Surveying and engineering instruments	1,846	2,418	1.31	18–33
9190	"Other" scientific laboratory and professional instruments and apparatus	11,716	12,653	1.08	3–87
9242	Phonograph records [4]	26,979	10,252	.38	40
9293	String instruments	139	87	.63	2–6
9570	Clocks, electric	1,722	1,024	.59	16
	Clocks, except electric [3]:				
9571	1-day alarm clocks [3]	4,624	4,061	.88	26–40
9572	Mantel, novelty, and wall clocks	361	186	.52	26–40
9579	"Other" clocks and parts	274	362	1.32	17–48
	Watches:				
9580	Without jewels	1,089	4,153	3.81	av. 46
9581	With jewels	238	5,824	24.47	av. 46
9589	Parts	54	638	11.81	25–66
9591	Time recording devices and parts	153	119	.78	[2]
9610	Paintings, etchings, engravings, and statuary	305	649	2.13	[2]
	Lamps and illuminating devices, except electric:				
9791	Incandescent mantels	14	18	1.29	9
9792	Lanterns, wick	19,035	2,792	.15	[2]
9793	Gasoline pressure lamps, lanterns, and parts	364	204	.56	[2]
9794	"Other" lamps, except electric	7,499	2,405	.32	[2]
9832	Candles	26,246	3,082	.12	23–41
	Total	2,895,873	614,361	0.21	.....
	IMPORTS				
5350.2	Decorated, colored, etc.—domestic or household ware	98	28	0.29	[2]
9200.0	Violins, violas, violin cellos, and double bases, made in or prior to the year 1800	4	200	50.00	2–6
	Total	102	228	2.24	.....

[1] Included also in table 8 (Perishable).

[2] Not available.

[3] Not elsewhere specified.

[4] Included also in table 10 (Style Factor).

SOURCE: *Foreign Commerce and Navigation of the United States, Calendar Year 1939*, U. S. Department of Commerce.

TABLE 10.—*Style-Factor Commodities in United States Trade with the Republic of Panama, 1939*

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	EXPORTS				
0647	Women's and misses' boots and shoes	6,269	$12,881	$2.05	11
	Women's and children's handbags, pocketbooks and purses:				
0688	Of leather	3,644	3,827	1.05	5–9
0689	Of materials other than leather	34,907	23,056	.66	5–9
0753	Fur wearing apparel	7	125	17.86	4–6
3122	Women's cotton dresses and ensembles	19,984	19,754	.99	av. 11
	Wool wearing apparel:				
3675	Knit bathing suits	3,867	11,282	3.92	10
3681	Women's and children's wool clothing	1,626	2,717	1.67	16
3742	Silk dresses, skirts, and blouses	1,356	4,050	2.99	10
3759	"Other" silk wearing apparel	2,406	7,988	3.32	8–16
3799	"Other" silk manufactures	419	1,853	4.42	8
	Rayon and other synthetics textiles:				
3852	Dresses, skirts, blouses, and other outerwear, not knit or crocheted	41,417	79,619	1.92	10
3853.1	Knit or crocheted dresses and ensembles	908	1,505	1.66	10
3853.2	"Other" knit outer wear	951	2,311	2.43	8–12
	Hats and hat bodies of straw, palm leaf, etc.:				
3944	"Other" sewed	2,688	3,061	1.14	3–10
3945	"Other" woven	2,889	3,445	1.19	3–10
3952	Women's and girls' fur-felt hats	70	400	5.71	3–6
	Exposed motion-picture films:				
9121.1	Negative, features (4,000 linear feet or over)	35	150	4.29	av. 40

Digitized by Google

TABLE 8.—*Perishable Commodities in United States Trade with the Republic of Panama, 1939*—Continued

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	EXPORTS—continued				
8121	Serums and antitoxins for human use	1,385	$5,055	$3.65	[1]
8122	Vaccines for human use	940	2,699	2.87	[1]
8123	Glandular products, organotherapeutics, enzymes, ferments, and culture media	2,927	6,440	2.20	[1]
	Total	9,104,263	842,621	.09	
	IMPORTS				
0086.2	Turtles	7,650	445	0.06	[1]
0840.0	Male horses, for breeding	1,265	800	.63	[1]
0862.5	Birds, [2] live birds valued $5 or less each	61	26	.43	[1]
0906.9	Live animals	1,036	228	.22	[1]
1300.0	Plantains, green or ripe	415,375	3,323	.01	15
1301.0	Bananas, green or ripe	265,255,409	2,923,857	.01	18
	Total	265,680,796	2,928,679	.01	

[1] Not available.

[2] Included also in table 9 (Fragile).

[3] Not elsewhere specified.

[4] Not specially provided for.

SOURCE: *Foreign Commerce and Navigation of the United States, Calender Year 1939*, U. S. Department of Commerce.

TABLE 9.—*Fragile Commodities in United States Trade with the Republic of Panama, 1939*

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	EXPORTS				
0092	Eggs in the shell [1]	794,289	$107,937	$0.13	24
2535	Flowers and foliage, cut, fresh, and preserved [1]	396	91	.23	av. 20
2599	All other nursery or greenhouse stock [1]	6,600	528	.08	16
3963	Artificial or ornamental flowers, fruits, vegetables, etc.	806	854	1.06	3–6
5212	Plate glass	17,733	3,997	.23	64–80
5215	Cylinder, crown and sheet glass	18,346	3,518	.19	45–100
5217	Laminated glass and manufactures	201	355	1.22	64–80
5218	Rolled glass	3,735	658	.18	30–60
5220	Rolled, cylinder, crown and sheet glass, obscured by coloring prior to solidification, not less than ¼ inch in thickness	878	139	.16	30–100
5230	"Other" glass	54,050	11,891	.22	[2]
	Unfilled glass containers:				
5232	Pharmaceutical and proprietary ware including prescription bottles, ampoules and, vials	138,900	8,334	.06	11–26
5234	Beverage bottles, including soda, beer, and alcoholic beverage bottles	223,930	44,786	.20	22–30
5235	Used glass containers of all types	71,650	2,866	.04	22–30
5236	"Other" unfilled glass containers	370,850	14,834	.04	22–30
5237	Tumblers, drinking glasses, and stemware, plain, cut, or engraved	245,540	12,277	.05	12–25
5239	Table glassware, [3] plain, cut, or engraved	303,680	15,184	.05	12–30
5255	Lamp chimneys and lantern globes	15,881	2,144	.14	3–9
5261	Globes and shades for lighting fixtures	27,540	3,415	.12	3–9
5291	Chemical glassware	7,638	3,570	.47	6–9
5292	Glass electric insulators	292	151	.52	30
5299	"Other" glassware	111,020	11,102	.10	[3]
5320	Table and kitchen articles and utensils	13,571	3,476	.26	12–36
6197	Precision scales, balances, and weights for laboratory use	71	223	3.14	av. 18
	Transmission and distribution apparatus:				
7035	Watt-hour and other measuring meters	10,596	9,007	.85	37–64
7036	Electrical indicating instruments	1,670	2,990	1.79	5–17
7037	Electrical recording instruments	242	633	2.62	25
7038	"Other" electrical testing apparatus and parts	2,094	2,115	1.01	[3]
	Electrical appliances (electric incandescent lamps):				
7063	For automobiles, flashlights, and Christmas trees	3,046	3,960	1.30	5–12
7064	"Other" metal filament lamps	32,651	21,876	.67	5–12
7065	"Other" electrical lamps	3,296	1,648	.50	4–12
7067	Flood lights	2,170	868	.40	8–15
7075.1	X-ray tubes	839	3,245	3.87	2
7075.5	"Other" X-ray apparatus and parts	16,056	12,684	.79	14–60
7075.9	"Other" therapeutic apparatus and parts	1,805	2,003	1.11	[2]
	Radio apparatus:				
7076	Transmitting sets, tubes, and parts	4,145	8,829	2.13	9–36
7077	Receiving sets	75,650	94,563	1.25	7–29
7078	Radio receiving tubes	1,742	3,501	2.01	9
7079	Receiving-set components	6,297	9,320	1.48	11–36
7080	Loudspeakers	793	325	.41	13
7081	"Other" receiving set accessories"	1,983	2,459	1.24	[2]
7082	Telegraph apparatus and parts	452	624	1.38	24
7083	Telephone instruments	898	1,689	1.88	50
7092	Starting, lighting, and ignition equipment	3,944	1,696	.43	[2]
7099.1	Electric razors	105	333	3.17	16
7741	Gas meters and parts	25,748	8,497	.33	[2]
7742	Water meters and parts	15,577	7,477	.48	[2]
	Accounting and calculating machines:				
	Listing-adding-bookkeeping machines	373	913	2.45	16–24
7753	Typewriter-bookkeeping-billing machines	566	1,290	2.28	15–20
7756	Listing-adding machines	4,299	9,156	2.13	16–34
7757	Calculating machines	1,300	3,769	2.90	16–23
	Cash registers:				
7764	New	10,061	12,576	1.25	17–31
7766	Used and rebuilt	7,732	2,629	.34	17–31
	Typewriters:				
7770	Standard, new	17,151	14,235	.83	19
7772	Portable, new	4,641	3,806	.82	24
7774.1	Rebuilt	3,675	2,058	.56	20
7774.9	"Other" used	100	63	.63	20
7948	Aircraft instruments and parts	75	459	6.12	[2]

Digitized by Google

TABLE 9.—*Fragile Commodities in United States Trade with the Republic of Panama, 1939*—Continued

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	EXPORTS—continued				
	Explosives:				
8604	Dynamite	54,240	$6,864	$0.13	48
8609	Explosives other than smokeless powder and dynamite	18,850	4,738	.25	30–53
8625	Safety fuses	1,300	363	.28	22–28
8629	Blasting caps	704	2,045	2.90	36
	Cameras:				
9001	Motion-picture substandard gage (less than 35 mm.)	2,788	5,256	1.89	36
9002.3	Aerial, studio, photo-engraving, coin-operated, and similar types of cameras for professional, scientific, or commercial uses	117	395	3.38	17–40
9003	Cameras, other than motion pictures, box type (set focus)	2,905	1,944	.67	17–40
9005	Cameras, other than motion pictures, "other"	2,549	5,333	2.09	av. 40
9006	Parts of cameras, except lenses	73	438	6.00	(2)
	Motion-picture projectors:				
9007	Standard gage (35 mm.)	181	352	1.94	av. 11
9008.1	Substandard gage (less than 35 mm.), silent	3,845	2,817	.73	20–28
9008.2	Substandard gage (less than 35 mm.), sound	99	475	4.80	14
	Motion-picture sound equipment:				
	Recording	18	27	1.50	(2)
	Reproducing	6,738	6,334	.94	av. 11
9112	Stereopticons, magic lanterns, and other projection apparatus	1,699	5,912	3.48	(2)
9142	Ophthalmic lenses	240	960	4.00	9–29
9143	Spectacles, eyeglasses, goggles, lenses, [3] and frames	5,217	7,200	1.38	11–41
9147	Lenses, not fitted to instruments	125	1,697	13.58	45
9149	"Other" optical goods	2,068	6,658	3.22	(2)
9160	Surveying and engineering instruments	1,846	2,418	1.31	18–33
9190	"Other" scientific laboratory and professional instruments and apparatus	11,716	12,653	1.08	3–87
9242	Phonograph records [4]	26,979	10,252	.38	40
9293	String instruments	139	87	.63	2–6
9570	Clocks, electric	1,722	1,024	.59	16
	Clocks, except electric [5]:				
9571	1-day alarm clocks [3]	4,624	4,061	.88	26–40
9572	Mantel, novelty, and wall clocks	361	186	.52	26–40
9579	"Other" clocks and parts	274	362	1.32	17–48
	Watches:				
9580	Without jewels	1,089	4,153	3.81	av. 46
9581	With jewels	238	5,824	24.47	av. 46
9589	Parts	54	638	11.81	25–66
9591	Time recording devices and parts	153	119	.78	(2)
9610	Paintings, etchings, engravings, and statuary	305	649	2.13	(2)
	Lamps and illuminating devices, except electric:				
9791	Incandescent mantels	14	18	1.29	9
9792	Lanterns, wick	19,035	2,792	.15	(2)
9793	Gasoline pressure lamps, lanterns, and parts	364	204	.56	(2)
9794	"Other" lamps, except electric	7,499	2,405	.32	(2)
9832	Candles	26,246	3,082	.12	23–41
	Total	2,895,873	614,361	0.21	.....
	IMPORTS				
5350.2	Decorated, colored, etc.—domestic or household ware	98	28	0.29	(2)
9200.0	Violins, violas, violin cellos, and double bases, made in or prior to the year 1800	4	200	50.00	2–6
	Total	102	228	2.24	.....

[1] Included also in table 8 (Perishable).

[2] Not available.

[3] Not elsewhere specified.

[4] Included also in table 10 (Style Factor).

SOURCE: *Foreign Commerce and Navigation of the United States, Calendar Year 1939*, U. S. Department of Commerce.

TABLE 10.—*Style-Factor Commodities in United States Trade with the Republic of Panama, 1939*

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	EXPORTS				
0647	Women's and misses' boots and shoes	6,269	$12,881	$2.05	11
	Women's and children's handbags, pocketbooks and purses:				
0688	Of leather	3,644	3,827	1.05	5–9
0689	Of materials other than leather	34,907	23,056	.66	5–9
0753	Fur wearing apparel	7	125	17.86	4–6
3122	Women's cotton dresses and ensembles	19,984	19,754	.99	av. 11
	Wool wearing apparel:				
3675	Knit bathing suits	3,867	11,282	3.92	10
3681	Women's and children's wool clothing	1,626	2,717	1.67	16
3742	Silk dresses, skirts, and blouses	1,356	4,050	2.99	10
3759	"Other" silk wearing apparel	2,406	7,988	3.32	8–16
3799	"Other" silk manufactures	419	1,853	4.42	8
	Rayon and other synthetics textiles:				
3852	Dresses, skirts, blouses, and other outerwear, not knit or crocheted	41,417	79,619	1.92	10
3853.1	Knit or crocheted dresses and ensembles	908	1,505	1.66	10
3853.2	"Other" knit outer wear	951	2,311	2.43	8–12
	Hats and hat bodies of straw, palm leaf, etc.:				
3944	"Other" sewed	2,688	3,061	1.14	3–10
3945	"Other" woven	2,889	3,445	1.19	3–10
3952	Women's and girls' fur-felt hats	70	400	5.71	3–6
	Exposed motion-picture films:				
9121.1	Negative, features (4,000 linear feet or over)	35	150	4.29	av. 40

Digitized by Google

TABLE 10.—*Style-Factor Commodities in United States Trade with the Republic of Panama, 1939*—Continued

Class No.	Commodity	Shipping weight (gross pounds)	Value	Value per pound	Density
	EXPORTS—continued				
9121.5	Negative, newsreels (less than 4,000 linear feet)	89	161	1.81	av. 40
9121.9	Negative, "other" (less than 4,000 linear feet)	9	20	2.22	av. 40
9123.1	Positive, features (4,000 linear feet or over)	34,031	85,227	2.50	av. 40
9123.5	Positive, newsreels (less than 4,000 linear feet)	893	1,749	1.96	av. 40
9123.9	Positive, "other" (less than 4,000 linear feet)	5,195	19,678	3.79	av. 40
9242	Phonograph records [1]	26,979	10,252	.38	40
9516	Catalogs and pamphlets	10,040	3,012	.30	30-40
9523	Music in books and sheets	513	195	.38	30-40
9560	Calendars, printed or unprinted, and advertising novelties	29,150	6,996	.24	30-40
	Total	230,342	305,314	1.33	.....
	IMPORTS				
9023.0	Motion-picture film negatives, newsreels, undeveloped, made of film of American manufacture and exposed abroad	13	87	6.69	41
9025.7	Motion-picture film positives, prints or duplicates—shorts (less than 4,000 linear feet) Newsreels	6	20	3.33	34-74
	Total	19	107	5.63	.....

[1] Included also in table 9 (Fragile).
SOURCE: *Foreign Commerce and Navigation of the United States, Calendar Year 1939*, U. S. Department of Commerce.

APPENDIX

The volume of air-cargo which will move between the United States and foreign countries in the future will depend upon a number of ecomomic factors, such as the comparative speeds, costs, reliability, convenience, and quality of service of air carriers compared with surface carriers. A substantial part of air-cargo tonnage which is likely to move will consist of commodities which previously moved by steamship, while an unknown percentage of future air-cargo shipments will consist of new traffic, especially perishables, made possible by the much faster service offered by air carriers.

In initiating this series of studies, it is believed that an analysis of pre-war trade will furnish some indication of the specific commodities that may be diverted to air carriers in the post-war period. Since the year 1939 is the latest period during which United States trade with Latin America did not show the effects of war, it was decided to use the United States export and import statistics for that year as the basis for study. In studying the thousands of commodities which moved between the United States and Latin America countries, it was agreed that at least four basic factors are of major importance in determining which should be selected as offering the best prospects for transport by air. These are as follows: (1) Value per pound, (2) perishability, (3) fragility, and (4) style factor, including obsolescence.

It is recognized that no single one of these factors is necessarily of sufficient importance to justify the higher charges which will have to be made for air carriage in comparison with surface transport. It is also evident that a commodity which appears suitable for air carriage on the basis of only one factor is not as likely to go by air as one which is suitable on the basis of two or more factors. For example, a commodity worth $5 per pound which is also perishable, fragile, or possessed of a style factor is more likely to go by air than a commodity equally valuable lacking any of these other favorable characteristics.

In addition to the four major categories covered in this study there are others which merit investigation Among these may be mentioned economies in packing, insurance, size of shipment, density, and various capital costs. Not all of these have been investigated here because the foreign trade statistics utilized did not lend themselves to such analyses. The experience of the Army and Navy air-transport services during the war has demonstrated that substantial packing economies are possible for almost all commodities flown. These economies for certain commodities have reached 70 percent of the total shipping weight, while the average reduction in shipping weight has been reported as approximately 30 percent. A special study of potential packing economies is planned for the commodities included under the four categories shown in this report.

In the past many commodities have been shipped by air to meet emergency situations with little consideration given to cost of service. It is clear that almost any commodity regardless of its economic characteristics may be sent by air under conditions of extreme emergency. Perishable pharmaceuticals and machine tools and parts are classes of commodities which have previously constituted important emergency shipments. Practically all of these are already included in this study because of their high value per pound. In addition to strictly emergency shipments, there will be shipments of odd items for the filling in of inventories where sudden or unexpected increases in demand result in shortages.

Categories Described

In deciding which commodities should be included in the four categories adopted, the question of definition of terms immediately arose, especially in the case of categories 2, 3, and 4 which cover perishability, fragility, and style factor. The bases for selection are briefly described below:

1. Value Per Pound

In determining which commodities should be screened on the basis of value per pound it was necessary to decide first whether net weight or shipping weights should be used, then to decide upon the minimum value per pound, and finally, after a minimum value per pound had been chosen, into how many subclasses the commodities falling above this minimum should be divided.

Since the charges to the shipper are based on gross shipping weights, rather than net weights, it was concluded that such weights were the proper ones to use in an analysis of air-cargo potentials, and they will be used exclusively in each study of the series except the first. The first study covering trade between the United States and Brazil was begun at a time when an adequate body of data on gross shipping weights was not readily available. More recently such data have become available.

After consultation with various commodity specialists it was decided that all commodities with a value of less than $0.50 per pound should be eliminated from the first category. It was felt that few commodities below that minimum would offer prospects for air carriage in the immediate post-war period. In fact, it is believed that many commodities above $0.50, particularly between $0.50 and $1, offer slight prospects for air-carriage unless additional factors, such as perishability, fragility, or style factor are also involved. A commodity worth $0.50 a pound has a value of $1,000 per ton. If it is assumed that the typical air-borne commodity moves 4,000 miles between the United States and South America and that the air-line charge is $0.15 per ton-mile, then the transportation charges on 1 ton would equal $600 or 60 percent of the value of the com-

Digitized by Google

modity. A commodity worth $3 a pound has a value of $6,000 per ton. On the basis of the assumptions just stated, air-cargo charges would amount to $600 or only 10 percent of the value of the commodity. These figures may be compared with the analogous relationships for movement of railway freight in the United States. In 1939 railway freight revenue equalled 8.43 percent of the value of all commodities carried.

The commodities valued at $0.50 per pound and over have been divided into eight groups as follows:

Group 1—$0.50-$0.99 per pound.
Group 2—$1-$1.99 per pound.
Group 3—$2-$2.99 per pound.
Group 4—$3-$3.99 per pound.
Group 5—$4-$4.99 per pound.
Group 6—$5-$9.99 per pound.
Group 7—$10-$24.99 per pound.
Group 8—$25 up per pound.

It is evident not only that the commodities in the higher-value groups offer better prospects for air carriage than those in the lower groups, but also that a larger percentage of the commodities in the higher-value groups are likely to go by air. For example, if 2 percent of the commodities in group 1 appear to offer especially good prospects for air carriage it might be expected that 4 percent in group 2, 6 percent in group 3, and so on would offer similar prospects.

2. Perishability

In determining the list of commodities to be included under the second category, perishability, it was necessary first to define the term perishable. It is evident that a large number of commodities would be perishable if a long enough time period and sufficient exposure to the elements were assumed. In deciding whether or not a commodity is perishable when moving in international trade, consideration has been given only to the normal time spent in transit via usual surface methods of transportation, assuming customary packing, handling, and stowage of the commodity. If, for example, apples packed in barrels can be shipped from New York to Rio de Janeiro in 4 weeks, while apples packed in barrels normally do not deteriorate in less than 8 weeks, then apples, for the purposes of this study, will not be considered perishable. It should be pointed out that any commodity which requires refrigerants, special temperature control, or ventilation during the period of movement is also classed as perishable.

In order to determine which of the commodities met the tests of the definition aforementioned, the cooperation of numerous commodity specialists of the Department of Commerce and other Government agencies was secured.

3. Fragility

Fragility, or breakability, is a term which, like perishability, could characterize almost all commodities under certain conditons. For the purposes of this study a commodity is defined as fragile or breakable when special care in handling or special packing is required to avoid damage under normal conditions of shipment. No attempt has been made to classify the commodities selected in respect to differing degrees of fragility.

4. Style Factor

Under the category designated style factor are included all of those commodities which lose their economic value at an exceptionally rapid rate with the passage of time because of a decline in the demand rather than a change in the physical nature of the product. Products which are subject to obsolescence are included. Examples of such are newspapers, motion-picture films, and certain textiles, such as wearing apparel.

Density or Weight

The density or weight per cubic foot of a commodity is one factor affecting the cost of moving commodities. In any transportation vehicle where space rather than weight is the limiting factor, a commodity with a low density costs more per unit of weight to move than one with a higher density, and consequently, must be charged a higher rate per ton-mile. In this series of studies the density is shown where the information is available for all commodities included in the four categories listed above. In some instances, no specific density is shown but instead a density range is given. This indicates a variation in the method of packing. Some commodity classifications, furthermore, cover such a wide range of individual articles lumped together that it is impossible to determine either a *specific* density or a density range. An example of this type of "basket" classification is Export Class No. 0699 (Other Leather Manufactures).

Upon analysis, density appears to be of less importance than the four major criteria already discussed, and, on the basis of new designs for post-war air cargo planes, may become even less significant in the future.

Size of Shipments

The economic and technological characteristics of steamship operations make this form of transportation especially suitable for large shipments of goods weighing many tons. These characteristics are reflected in steamship freight-rate structures which in many instances are quoted in terms of 1 ton or 40 cubic feet. Since it is customary to levy a minimum bill of lading charge, which between the United States and Brazil, for example, amounts to $7.50, as shipments fall below a certain weight, the rate per ton-mile rises progressively so that in the case of shipments of 25 or 50 pounds the rate per ton-mile will be several times that of a shipment weighing 1 ton or more. On such small shipments, therefore, the differences in costs between steamship and air carrier services are reduced to a minimum and air carriers will enjoy their most favorable competitive position.

The only important alternative to the freight services offered by the steamship companies is parcel post, which limits maximum shipments to a few pounds. Frequently, parcel-post charges, when reduced to a rate per ton-mile basis, amount to $0.06 or $0.08 per ton-mile for shipments of 25 to 30 pounds.

It is impossible to determine from published foreign trade statistics what commodities are shipped in quantities weighing less than 1 ton. The figures show the total weight shipped per year for individual commodities, and, in many instances, such shipments total much less than 2,000 pounds but it can not be determined whether these small shipments were shipped individually or consolidated with other commodities in lots weighing 1 ton or more. In recent years it has become increasingly prevalent for producers and freight forwarders to consolidate small shipments into large ones to take advantage of the lower steamship freight rates available on large shipments.

Post-War Air Cargo Rates

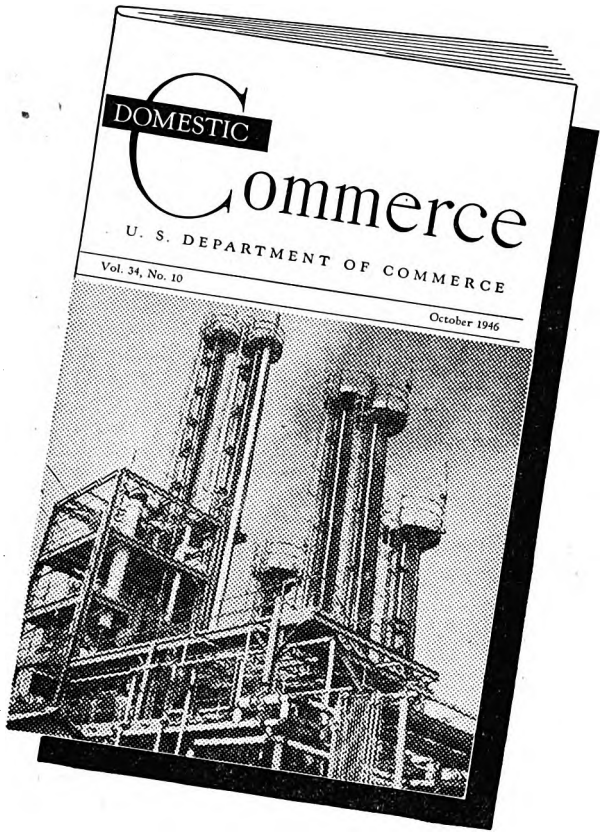
Recent estimates of the level of air cargo rates after the war vary from $0.05 to $0.25 per ton-mile. The differences in the estimates are primarily the result of differences in the assumptions on which the forecasts are based or on the completeness of the services under consideration. Some authorities in estimating air cargo rates have in mind airport-to-airport movement only, while others include terminal handling and pick-up and delivery services. Some writers in making post-war predictions are thinking of the period immediately following the cessation of hostilities rather than developments during the first decade. Still others base their predictions upon the assumption that the latest technological improvements will be incorporated into exclusively designed air cargo planes and that these planes will be available shortly after the war.

In the case of air cargo carriage between the United States and Latin American countries in the immediate post-war period, air cargo rates per ton-mile will depend upon whether the traffic in both directions is sufficiently large to justify specially designed air cargo planes which carry nothing but commodities. If the volume of traffic should prove to be this large, air cargo rates from airport to airport may prove to be feasible at a level of from $0.10 to $0.15 per ton-mile depending upon the territory served. If, on the other hand, air cargo volume proves to be so small that it must be carried in aircraft especially designed for the transportation of passengers and mail, then air cargo rates will probably be substantially higher.

☆U. S. GOVERNMENT PRINTING OFFICE: 1946—707798—116

Digitized by Google

Every Businessman Could Profit by Reading . . .



Pocket Size

DOMESTIC COMMERCE

96 Pages
of
Facts and Ideas!

- Timely news on problems that face businessmen today.
- Marketing information on numerous business activities.
- Economic surveys and trends.
- New products being designed for consumer use.
- Progress and changing conditions of industry and business.
- Monthly listing of all business service material published by the U. S. Department of Commerce.
- What's New—a regular feature on patents dedicated for public use, and new and abandoned patents.

These are typical of the material currently appearing. Articles written by specialists in the U. S. Department of Commerce as well as those of other governmental agencies.

Annual Subscription $1

Order today from the
Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.
(Make check payable to Treasurer, U. S. A.)

U. S. GOVERNMENT PRINTING OFFICE: 1946

Digitized by Google

cuments Room Foreign and Domestic Commerce Bureau

Industrial Reference Service

U. S. DEPARTMENT OF COMMERCE, W. AVERELL HARRIMAN, *Secretary*

Office of International Trade, ARTHUR PAUL, *Director*

Part 1. TRANSPORTATION and PUBLIC UTILITIES

Available in Parts Covering Selected Services and Commodities
Annual Subscription $1.50. Price this report 5 cents
For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., or any of the Department's Field Offices

Volume 4—Part 1 November 1946 Number 26

D 16953

The Railways of Newfoundland

By Seymour T. R. Abt, Transportation and Communications Division, Special Services and Intelligence Branch

Based on United States Foreign Service Reports and Other Sources

The Railways of Newfoundland

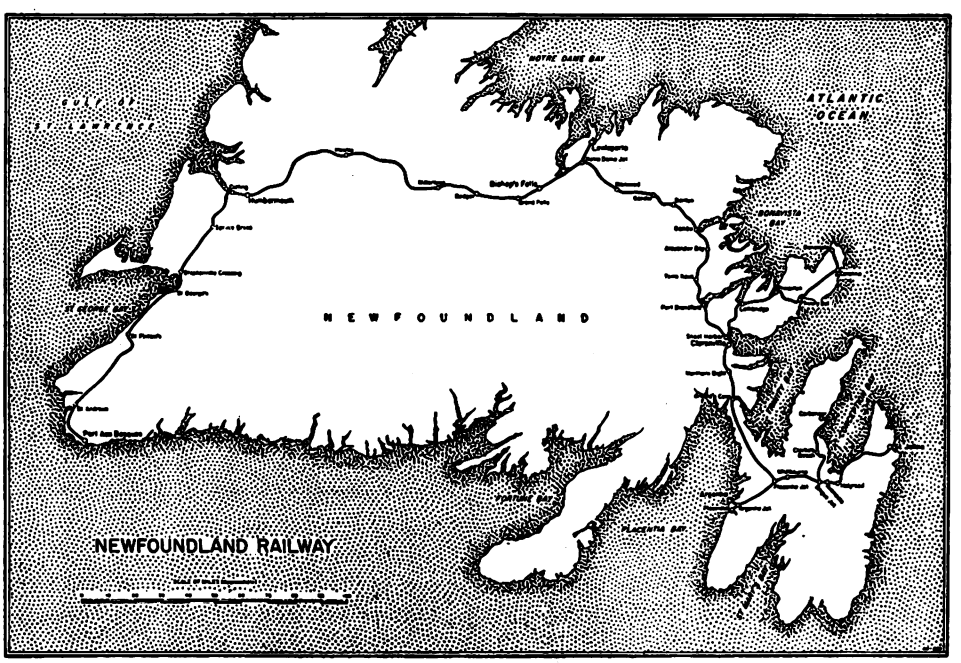
Newfoundland is an island of 42,734 square miles lying off the east coast of Canada across the mouth of the Gulf of St. Lawrence. On the north it is only about 12 miles from the Labrador coast and on the south about 98 miles from the Cape Breton coast. The chief mountain range extends along the western side, reaching an elevation of nearly 2,000 feet. The hills reach their summit within a few miles of the coast, and then spread out into an undulating country, consisting largely of barrens and marshes and intersected by numerous rivers and lakes. It is estimated that as much as a third of Newfoundland's surface is covered with these rivers and lakes. Most of the large rivers flow into bays on the northeast coast. On the borders of the lakes and watercourses good land is generally found which, in some cases, is heavily timbered.

Although Newfoundland is latitudinally in the same parallel as France, its climate is considerably colder because of the Arctic current which sweeps down the coast. Coastal temperatures range through the year from about zero to 80°F.

The Island is a British colony administered by a Commission of Government appointed by the United Kingdom. There are six members of the Commission, three from Newfoundland and three from the United Kingdom, exclusive of the Governor of the Island, who acts as chairman.

In 1941 the United States obtained 99-year leases to certain areas of Newfoundland and established military bases there.

(Note: The territory of Labrador, 120,000 square miles in area, which had been the subject of dispute between Newfoundland and Canada, was awarded to Newfoundland by a judgment of the Privy Council in 1927. Labrador was largely unexplored until the advent of the airplane. Its development by Newfoundland has so far been slow because of the limited financial resources of the island. No railroads have been reported for Labrador).



Economy

Fishing is the principal occupation of Newfoundland's population of about 305.000 Cod, salmon, halibut, lobster, herring, and caplin are exported in large amounts. Wood pulp is another thriving industry with 1250 sawmills in operation. There are extensive paper and pulp mills at various locations. Mineral resources are considerable. Large beds of iron ore have been found on Bell Island in Conception Bay, on the east coast, and other rich deposits have been discovered on the west coast. Other minerals are copper, coal, gold-bearing quarts, silver, lead, zinc, limestone, and fluorspar.

Rainfall is abundant in Newfoundland, and melting snows in spring provide further moisture. Potatoes, cabbage, and turnips are the most generally produced crops, but beets, carrots, peas, and beans also are grown. Corn, cucumbers, and tomatoes can be raised in sheltered situations. Hay

Digitized by Google

grows abundantly with proper cultivation, but not enough land is cleared to allow production in quantities sufficient for local requirements. Newfoundland imports many of its basic food requirements, including flour, sugar, and oats, as well as cattle and poultry feed.

Canada and the United States furnish most of Newfoundland's imports and, with the United Kingdom, absorb most of its exports. In 1943-44, total imports were valued at $62,500,000 (including $15,900,000 for the armed forces), of which Canada supplied $41,500,000 and the United States $18,100,000. During the same period, exports totaled $42,400,000 of which the United States took $13,600,000, the United Kingdom $11,400,000, and Canada $6,900,000.

Transportation

With its irregular coastline, Newfoundland provides many sheltered harbors and good anchorages. Shipping lines connecting Newfoundland with the United States before the war included Furness Withy & Co., Furness Red Cross, and Marine Agencies, Ltd. In addition, Newfoundland Canada Steamships connects the island with Canada.

The Newfoundland Railway supplements its inland transportation with coastwise steamer service. It also operates a triweekly summer ferry between Port Aux Basques and North Sydney, which is served by the Canadian National Railways. As occasion demands, the Newfoundland Railway offers ship service to Halifax.

Newfoundland has long been a prominent stop in transoceanic air travel. Commercial service is offered by Pan American Airways between New York and Botwood, and by Trans-Canada Air Lines between Moncton, N. B. and St. John's. British Overseas Airways Corporation and American Export Airlines also make stops at Botwood.

Highway transportation is undeveloped in Newfoundland. There are only 80 miles of paved road, almost entirely confined to the southeastern Avalon Peninsula. There are also 1,350 miles of gravel highway, 875 miles of gravel secondary roads, and 4,200 miles of local roads. In 1943 motor-vehicle registration totaled only 4,849 cars, 1,828 trucks, and 125 motorcycles.

The Newfoundland Railway

The Newfoundland Railway, a Government-owned line of 3'6" gage, is the only common-carrier railroad on the Island. Connecting Port Aux Basques with St. John's, the line serves the coastal areas on both the east and west, touching most of the important ports on its route, and arches across the northern part of the Island at its widest point. Newfoundland's industrial development really dates from 1897, when the railway was completed.

The railway is administered by the Commissioner for Public Utilities. Its offices are located at St. John's.

The main line of the Newfoundland Railway is 547.2 miles long, and is divided into two divisions. The Eastern Division, from St. John's to Bishop's Falls, is 267.3 miles long with Clarenville, Mile 131.1, a subdivision point. The Western Division, from Bishop's Falls to Port Aux Basques, is 279.9 miles long with Humbermouth, Mile 403.8 a subdivision point.

Branch lines are all in the Eastern Division. They total 157.9 miles as follows:

	Miles
Carbonear Sub-Division:	
Brigus Junction to Carbonear	38.4
Argentia Sub-Division:	
Placentia Junction to Argentia	21.2
Placentia Sub-Division:	
Argentia Junction to Placentia	1.0
Bonavista Sub-Division:	
Shoal Harbour to Bonavista	88.0
Lewisporte Sub-Division:	
Notre Dame Junction to Lewisporte	9.3

Permanent way and structures.—Curvature, 12°. Gradient, 2.5 percent. Ballast. pit run gravel. Ties, untreated local softwood. Rails, 70-lb. British standard sections on main line, 70-lb. American standard sections on Argentia branch, 50-lb; American standard sections on other branches. Signals, manually operated and train orders. Bridges, 137 (195 spans) on main line, 44 (44 spans) on branch lines. Clearance, 16 feet in height from base of rail; 5 feet in width to either side of center line of track. Tunnels, none.

Equipment.—Statistics are not available. All locomotives burn coal. Express-passenger locomotives are in good condition, but freight, switch, and branch-line locomotives are old and require constant servicing. Eight locomotives were purchased from the United States in 1944-45. Box, flat, and tank cars are similar in construction to those used in the United States, except that they have less weight and capacity. In 1944-45, Newfoundland imported 75 freight cars from Canada. Passenger equipment includes 32 streamlined, all-steel, air-conditioned cars purchased in 1942. Some of these are sleeping cars used on the so-called "foreign express" trains, which run a round trip across the island three times weekly in the summer and two times weekly in the winter. (Note: Winter snow and storms make railroad travel subject to delay). All other passenger cars, some of wood and the others of steel, are old. Each passenger train usually carries one baggage and one mail car.

In addition to its rail equipment, the company also operates a small fleet of trucks in the express business. As was mentioned above, the Newfoundland Railway operates a fleet of vessels. These include coastwise passenger-freight steamers serving outlying parts of the coast, a group of steamships plying to and from Canadian ports, and one or two smaller motor vessels.

In addition to the equipment of the Newfoundland Railway, 50 to 75 mining cars are operated by Buchans' mines, Buchans. These are used to carry lead, zinc, and copper concentrates to Botwood, the port of shipment. The cars are approximately the size of locomotive tenders, with less depth.

Repair facilities are located as follows: St. John's, Locomotive assembly and repair shops (capacity 6 locomotives). fully equipped machine shops, car repair shops (capacity 6 cars). Bishop's Falls, 9 stalls. Humbermouth, 5 stalls. Port Aux Basques, 3 stalls. Clarenville, 3 stalls. Bonavista, 2 stalls. Lewisporte, 2 stalls. Carbonear, 1 stall. Argentia. 1 stall.

No railway equipment is produced in Newfoundland. Almost all materials and parts used in servicing the motive

Newfoundland Railway—Imports of Railway Equipment, Year Ending March 31, 1945

Item	From Canada		From United States	
	Quantity	Value	Quantity	Value
Wheels and axles (railway and tram cars) pounds	779,895	$20,401	83,332	$4,258
Rails tons	50	1,143	2,280	11,240
Rail joints, splice bars, fishplates and tie plates pounds	7,523	384	330,543	8,201
Crossings (railway) do			4,465	426
Spikes do	206	877	58	268
Bolts, nuts, washers, and other fittings do	10,381	702	31,491	3,136
Electric motor (railway) number			61	544
Locomotives (steam) do			8	145,949
Locomotive parts and accessories		121,054		22,346
Cars (railway freight) number	75	227,520		
Motor cars (railway) do	1	489	20	2,799
Car parts (railway and tram), except axles and wheels		12,991		13,338
Signals, attachments, and parts (railway and tram)		7,129		343
Air brake equipment and parts (railway)		2,138		4,451
Total		394,828		217,301

Digitized by Google

power, rolling stock, and tracks are imported. The accompanying table lists imports of various classes of railway equipment by the Newfoundland Railway from Canada and the United States, during the year April 1, 1944, to March 31 1945.

Traffic (1944).—Freight, 817,155 tons. Chief commodities carried were ore, paper, pulpwood, timber, and fish. Passengers, 405,810. Average rates, 2.73 cents per ton-mile; 4.59 cents per passenger-mile.

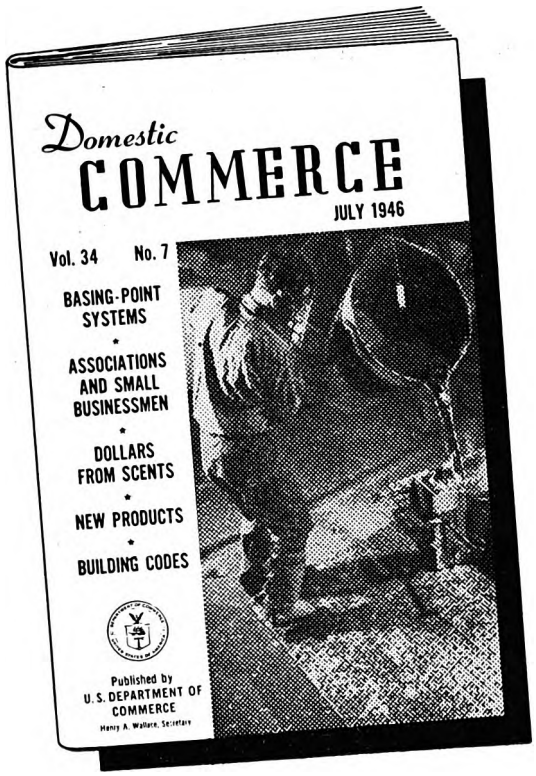
Financial data (1944).—Operating revenues (from railway operations only), $5,076,148; other revenues, $6,653,391. Operating expenses, $5,790; 389; other expenses: $5,825,395.

Employees (1944).—Total 4,000 including employees of dry dock, machine shops, and all operations in connection with the railway.

☆U. S. GOVERNMENT PRINTING OFFICE: 1946—707798—126

Digitized by Google

Every Businessman Could Profit by Reading . . .



Pocket Size

DOMESTIC COMMERCE

96 Pages of Facts and Ideas!

- Timely news on problems that face businessmen today.
- Marketing information on numerous business activities.
- Economic surveys and trends.
- New products being designed for consumer use.
- Progress and changing conditions of industry and business.
- Monthly listing of all business service material published by the U. S. Department of Commerce.
- What's New—a regular feature on patents dedicated for public use, and new and abandoned patents.

These are typical of the material currently appearing. Articles written by specialists in the U. S. Department of Commerce as well as those of other governmental agencies.

Annual Subscription $1

Order today from the

Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

(Make check payable to Treasurer, U. S. A.)

Digitized by Google.

Documents Room

Industrial Reference Service

U. S. DEPARTMENT OF COMMERCE, W. AVERELL HARRIMAN, *Secretary*
Office of International Trade, ARTHUR PAUL, *Director*

Part 1. TRANSPORTATION and PUBLIC UTILITIES

INDIANA UNIVERSITY
JAN 16 1947
LIBRARY

Available in Parts Covering Selected Services and Commodities
Annual Subscription $1.50. Price this report 5 cents
For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., or any of the Department's Field Offices

Volume 4—Part 1 | December 1946 | D 17430 | Number 27

Power Facilities of Argentina

By Guida Berrigan Hall, Transportation and Communications Division, Special Services and Intelligence Branch

Based in part on a consular report by Charles R. Burrows

The Republic of Argentina extends southward 2,300 miles from the borders of Bolivia to Cape Horn, and eastward from the ridge of the Andes to the South Atlantic seaboard. Paraguay, Brazil, and Uruguay form its northeastern boundary, while Chile and the Atlantic Ocean bound it on the west and east. Argentina is 930 miles at its widest part, and the country covers an area of approximately 1,080,000 square miles, or about four times the area of the State of Texas.

Argentina is comprised of 14 Provinces, 10 Territories, and the Federal District. In 1944, its population was estimated to be 13,909,950, with one-fifth living in the capital city, Buenos Aires, which is the largest city in South America.

Most of Argentina's inhabitants are white. Agriculture and stock raising are the principal pursuits; therefore, grains and meats comprise most of the exports. The industrialization of the country is rapidly expanding, and the per capita income of Argentina is perhaps higher than in any other South American country.

Argentina depends on the importation of fuels for the generation of a large portion of its required electric energy. The difficulties in obtaining such importations during the war years, with consequent greater realization of the country's dependence on foreign fuel supplies, accelerated the Government's interest in the development and nationalization of electric power—especially the development of Argentina's potential hydraulic resources. In the near future additional power supplies will be required for the expanding industrial area in the State of Buenos Aires, which lies far from the regions where hydroelectric power can be produced economically.

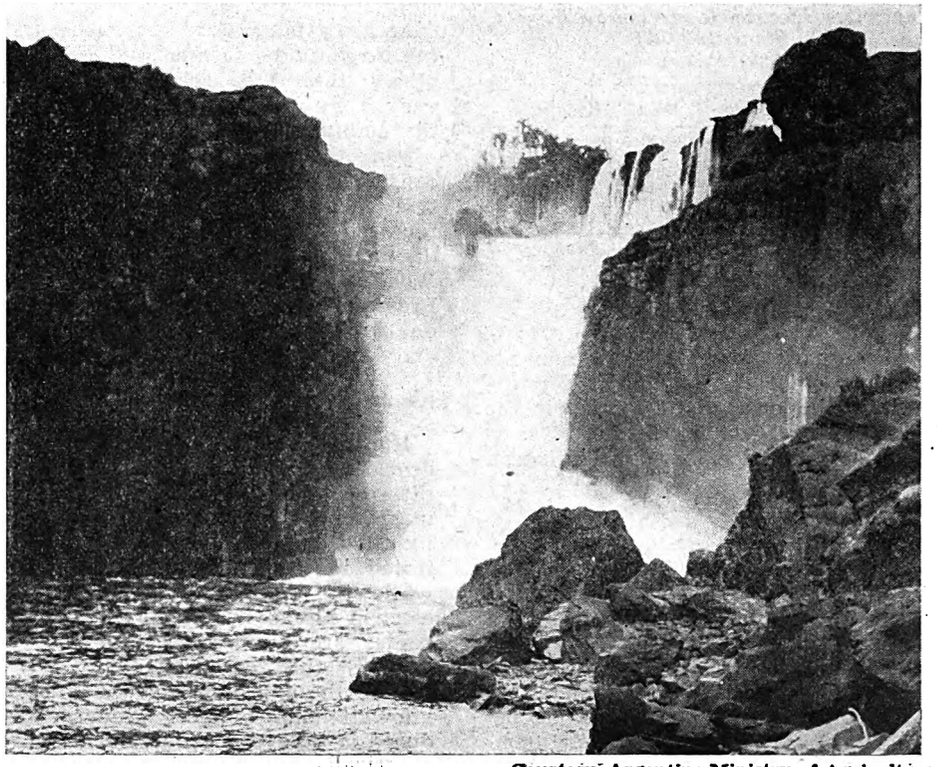
Fuels and Power

Coal and Coke

During the prewar years the annual average import of these fuels was slightly over 3,000,000 short tons and in 1939, the last normal year for imports of this type, Argentina received 3,305,023 short tons. Total imports for the years 1939 to 1945 inclusive are shown below:

	Short tons
1939	3,305,023
1940	2,280,850
1941	1,169,878
1942	616,121
1943	679,245
1944	678,909
1945	857,783

Before the war, the United Kingdom supplied almost two-thirds of Argen-



Courtesy, Argentine Ministry of Agriculture
Argentina—Iguazú Falls, Moreno Fall

Digitized by Google

tina's annual imports of coal. However, in 1945—perhaps for the first time in Argentina's commercial history—it failed to supply either coal or coke. On the other hand, South Africa, which entered this market with a shipment of only 6 tons of coal in 1938 and 7 tons in 1939, supplied Argentina with 383,234 tons in 1944 and 465,315 tons in 1945.

In 1945, the Argentine Government expressed considerable interest in the development of its natural resources of peat, lignite, and asphaltite, and a low grade of bituminous coal. These deposits are located in the Rio Turbio and Cancha Carreras regions of Santa Cruz, in Mendoza, Neuquen, and Patagonia. The Government's Yacimientos Petroliferos Fiscales (YPF) is currently carrying on investigations and geological surveys in the territories of Rio Negro, Chubut, Santa Cruz, and Neuquen, but no estimates of production have been made public.

In the 1944 annual report of the YPF (published on Nov. 21, 1945), the combined deposits of the above-named fuels in Rio Turbio are estimated at 6,930,000 short tons, and 165,000 short tons in Lepu, Chubut. Estimates of Argentina's total coal deposits vary greatly. A public statement was issued on November 17, 1945, by the Secretary of Industry and Commerce after a personal inspection of the Rio Turbio and Cancha Correras areas, placing the coal deposits of these areas at 33,000,000 tons. Expert opinion generally estimates Argentina's reserves to be about 96 percent asphaltite and 4 percent low-grade bituminous.

TABLE 1.—*Electric Generation by Type of Plant, 1939-43*

[In million kilowatt-hours]

Year	Steam	Diesel	Hydroelectric
1939	2,042.9	320.0	98.4
1940	2,114.1	317.8	118.1
1941	2,209.6	309.3	125.0
1942	2,325.9	294.3	126.3
1943	2,475.2	307.0	144.4

SOURCE: Committee on Statistics, Ministry of Finance.

Natural Gas

Argentina's principal gas deposits are in Comodoro Rivadavia; deposits of lesser importance are located in the Territory of Neuquen. Natural gas is only important locally as an industrial fuel.

Oil

Petroleum is exploited by the Argentine Government and also by private companies. The country consumes more petroleum products than it produces, and has always had to import such fuels in considerable quantities. Although national production of petroleum has increased steadily, consumption has increased even more rapidly. As an example, during 1932 to 1939, petroleum production increased 42 percent, while the amount of petroleum imported tripled and the importation of fuel oil increased by 55 percent. It is improbable that national petroleum production will increase in the future to the extent of self-sufficiency but, owing to the favorable location of the country's refineries, petroleum is likely to remain available to Argentina's industries at a reasonable price. There are five Government-owned refineries and 11 privately owned. In the latter group, the Nativa de Petroleo de Campana was the first to be established on the South American Continent.

TABLE 2.—*Total Installed Capacity of Plants and Total Annual Production, 1940-44*

Province	Capacity (in kilowatts)	Production (in kilowatt-hours)				
		1940	1941	1942	1943	1944
Buenos Aires	602,517	1,891,572,689	1,956,391,312	2,093,584,840	2,208,724,999	2,395,749,164
Catamarca	878					
Chaco Territory	7,120	10,267,810	10,120,170	11,098,300	11,712,400	13,540,100
Chubut	1,175	247,756	252,661	264,197	264,390	566,285
Cordoba	60,179	95,514,888	96,203,636	99,824,285	104,253,344	102,537,001
Corriene	3,438	2,373,640	2,500,220	2,586,050	2,716,740	3,180,850
Entre Rios	18,178	21,356,910	21,673,930	21,934,260	22,619,240	6,417,897
Formosa	868	1,362,090	1,637,280	1,566,390	1,658,290	1,842,490
Jujuy	2,085	2,060,000	2,091,170	2,200,620	2,185,400	
La Pampa	3,572	1,238,568	1,246,847	1,234,669	1,294,117	1,387,808
La Rioja	676					
Los Andes	5					
Mendoza	3,151	2,034,940	2,229,870	2,291,230	2,646,790	3,736,208
Misiones	1,004					
Neuquen	884					
Rio Negro	1,255					
Salta	4,599	5,415,030	5,822,840	6,275,190	2,785,350	6,960,852
Santa Fe	81,739	52,107,637	52,876,738	54,081,815	54,954,423	221,061,888
San Juan	4,452	11,558,480	12,012,020	12,011,650	13,176,920	8,871,901
San Luis	2,306	2,740,263	2,929,093	3,246,765	3,524,414	3,602,450
Santiago del Estero	4,761	3,263,970	3,498,351	5,147,794	5,637,379	5,910,615
Santa Cruz	741					
Tucuman	26,453	22,235,180	22,530,360	24,476,600	24,842,470	
Total	832,183	2,125,349,851	2,194,016,498	2,341,824,655	2,436,006,666	2,775,365,509

Wood

Accurate figures are lacking regarding Argentina's forests, and estimates of the total area covered by forests vary from one-fourth to one-eighth of the country's total acreage.

More than 7,000,000 tons of wood are consumed as fuel annually in Argentina, in addition to the 4,000,000 tons required in the average annual production of 800,000 tons of charcoal. Wood is used principally as fuel in the Provinces of Salta, Misiones, Santiago del Estero, Chaco, La Rioja, Formosa, and Tierra del Fuego.

Electricity

Hydroelectric development.—The hydroelectric potential of Argentina is of little economic value to that Republic inasmuch as both the population and industry of the country are concentrated in the Atlantic seaboard area, while the sites for possible hydroelectric plants in the foothills of the Andes are hundreds of miles away. It is for this reason that only 5 percent of the approximately 3,800,000,000 kilowatt-hours of electric energy produced in 1944 was generated in hydroelectrically operated plants. Of the remainder of that year's production, 12 percent was generated in diesel-operated plants and 83 percent in plants operated by steam turbines.

The estimated potential of all the streams in Argentina is about 5,000,000 horsepower, of which only 35,000 horsepower was developed in 1945. Included in the 5,000,000 figure are many small streams the development of which is not likely to be realized. There are also several important falls in Argentina which are capable of providing very large quantities of electric power, such as the Falls of Iguazu, the rapids of the Apipe, and the falls of the Salto Grande.

Following is a list of the rivers where the principal hydroelectric plants are located and the names of these plants, together with their respective installed generating capacities:

River	Plants	Capacity in horsepower
Rio Mendoza (Mendoza)	Cacheuta	12,900
Canal Zanjon (Rio Mendoza)	Lujan	2,020
Rio Primero (Cordoba)	Calera	7,600
Do	Bamba	5,700
Do	Dique Molet	1,700
Rio Lules (Tucuman)	La Quebrada	8,721
Rio Tercero (Cordoba)	Rio Tercero	15,000
Do	(Under construction)	20,000

Predominance of thermal plants.—Several factors have militated against a greater development of Argentina's hydroelectric power resources. In the first place, imports of coal from United Kingdom have long played an important part in Argentina's trade with that country, and ships which would otherwise arrive in ballast bring full cargoes of coal to Buenos Aires. Then, too, about one-fifth of the country's population lives in Buenos Aires or its environs, making that city the country's largest consumer of electric power. However, it is so far removed from the sources of hydroelectric power that the transmission of that type of energy is economically prohibitive in comparison with thermal power.

The nature of the rivers in the Sierras de Cordoba and the Andes,

Digitized by Google

TABLE 3.—*Production of Electric Energy, 1940-44*

Province or territory	Name of company [1]	Prime mover	Capacity (in kw.)	Production (in kilowatt-hours)				
				1940	1941	1942	1943	1944
Buenos Aires	A. & F. P.	Thermal	40,892	71,021,200	67,350,230	70,773,760	78,131,480	81,690,184
Do	C. A. D. E.	do	320,500	1,451,976,307	1,495,833,380	1,611,623,700	1,693,532,370	1,845,852,360
Do	SUIZO	do	1,675	3,567,140	3,753,360	3,802,240	4,285,580	4,381,020
Do	ITALO	Steam	1,720	3,642,349	3,225,682	3,187,777	3,244,241	3,231,107
Do	do	Thermal	200,331	347,877,544	372,543,876	391,543,468	418,183,954	449,241,178
Do	SUD	do	8,697	13,488,149	13,684,784	12,653,895	11,347,374	11,353,315
Subtotal			573,815	1,891,572,689	1,956,391,312	2,093,584,840	2,208,724,999	2,395,749,164
Do	Other	Thermal	28,702					
Total			602,517	1,891,572,689	1,956,391,312	2,093,584,840	2,208,724,999	2,395,749,164
Catamarca	Other	Hydro	379					
Do	do	Thermal	499					
Total			878					
Chaco Territory	A. & F. P.	Thermal	3,117	6,078,940	6,163,220	6,578,960	6,600,750	7,514,050
Do	SUIZO	do	3,372	4,188,870	3,956,950	4,519,340	5,111,650	6,026,050
Do	Other	do	631					
Total			7,120	10,267,810	10,120,170	11,098,300	11,712,400	13,540,100
Chubut	SUD	Thermal	226	247,756	252,661	264,197	264,390	566,285
Do	Other	do	599					
Do	do	Hydro	350					
Total			1,175	247,756	252,661	264,197	264,390	566,285
Cordoba	A. & F. P.	Hydro	8,805	72,082,010	90,151,180	93,877,630	98,172,330	996,424,742
		Thermal	29,839					
Do	SUD	Thermal	4,675	23,432,878	6,052,456	5,946,655	6,081,014	6,112,259
Subtotal			43,319	95,514,888	96,203,636	93,824,285	104,253,344	1,002,537,001
Do	Other	Hydro	11,035					
Do	do	Thermal	5,825					
Subtotal			16,860					
Total			60,179	90,514,888	96,203,636	99,824,285	104,253,344	1,002,537,001
Corrientes	SUIZO	Thermal	1,889	2,373,640	2,500,220	2,586,050	2,716,740	3,180,850
Do	Other	do	1,549					
Total			3,438	2,373,640	2,500,220	2,586,050	2,716,740	3,180,850
Entre Rios	A. & F. P.	Thermal	8,350	17,588,390	17,856,760	18,125,610	18,584,800	5,085,030
Do	SUIZO	do	2,976	3,768,520	3,817,170	3,808,650	4,034,440	1,332,867
Do	Other	do	6,852					
Total			18,178	21,356,910	21,673,930	21,934,260	22,619,240	6,417,897
Formosa	SUIZO	Thermal	810	1,362,090	1,637,280	1,566,390	1,658,290	1,842,490
Do	Other	do	58					
Total			868	1,362,090	1,637,280	1,566,390	1,658,290	1,842,490
Jujuy	A. & F. P.	Thermal	248	2,060,000	2,091,170	2,200,620	2,185,400	
Do	do	Hydro	928					
Do	Other	do	160					
Do	do	Thermal	749					
Total			2,085	2,060,000	2,091,170	2,200,620	2,185,400	
La Pampa	A. & F. P.	Thermal	787	1,036,790	1,038,200	1,011,330	1,057,110	1,142,629
Do	CADE	do	336	201,778	208,647	223,339	237,007	245,169
Do	Other	do	2,479					
Total			3,602	1,238,568	1,246,847	1,234,669	1,294,117	1,387,808
La Rioja	Other	Hydro	380					
Do	do	Thermal	296					
Total			676					
Los Andes	Other	Thermal	5					
Mendoza	A. & F. P.	do	1,310	2,034,940	2,229,870	2,291,230	2,646,790	3,157,010
Do	SUD	do	810					(11 mo.) 579,198
Do	Other	do	1,031					
Total			3,151	2,034,940	2,229,870	2,291,230	2,646,790	3,736,208
Misiones	Other	Thermal	1,004					
Neuquen	do	do	850					
Do	do	Hydro	34					
Total			884					
Rio Negro	A. & F. P.	Thermal	228					
Do	Other	Hydro	190					
Do	do	Thermal	837					
Total			1,255					
Salta	A. & F. P.	Thermal	3,665	5,415,030	5,822,840	6,275,190	6,785,350	6,960,852
Do	Other	do	934					
Total			4,599	5,415,080	5,822,840	6,275,190	6,785,350	6,960,852
Santa Fe	A. & F. P.	Thermal	13,700	40,019,300	40,540,570	41,174,320	42,502,480	43,957,301
Do	SUIZO	do	804	1,137,440	1,163,940	1,207,380	1,320,090	1,367,170
Do	ITALO	do	50,300					161,953,706
Do	SUD	do	10,832	8,452,467	8,947,538	8,324,675	7,928,003	10,289,391

Digitized by Google

with their extreme variations in runoff, makes the initial investment in hydroelectric generating stations very costly inasmuch as reserve thermal plants must also be constructed. Furthermore, the fact that fuels are obtained easily and cheaply in normal times favors the operation or development of thermal plants. For example, in the past, coal from Cardiff, Wales, delivered in Buenos Aires, has been cheaper than coal from Esquel (Argentina), because of the expense and difficulties of internal transportation.

During the war, a sharp reduction in the imports of foreign fuels forced most of the power plants in the seaboard area to employ certain products as substitute fuels, including corn, linseed, cottonseed, charcoal, sunflower seed, wheat, and barley, as well as oleaginous cakes such as cottonseed cake, and linseed expeller.

Decentralization of industry to aid hydroelectric development.—There is a growing interest in the decentralization of industry in Argentina which, if it materializes, will undoubtedly lead to the development of the country's hydroelectric potential, estimates for which have been placed at from 27,000,000 to 90,000,000 horsepower. The four large centers suitable for the development of hydroelectric power are the littoral with Iguazu Falls, Apipe, and Salto Grande del Uruguay; Nihuil and other rivers in the Andean area; the Provinces of Salta and Tucuman; and Rio Tercero and other rivers in the Province of Cordoba. To these four large centers which seem most likely to be first developed may be added the hydroelectric reserves of Patagonia, which have been estimated at 8,000,000 horsepower. (It should be pointed out that Iguazu Falls, Apipe, and Salto Grande del Uruguay would require the negotiation of treaties with Uruguay and Brazil, since they are on the frontiers of those countries.)

In 1930, in the Province of Buenos Aires, a number of small hydroelectric plants supplied power to industrial establishments. These, however, gradually discontinued operation when thermal stations were constructed. The first hydroelectric plant to be built in Argentina was erected in 1898 on the Rio Primero in the Province of Cordoba, and it furnished light and power to the City of Cordoba.

Production of Electric Energy

In 1944, only 5 percent of the electric power generated in Argentina was produced in hydroelectric plants in the Sub-Andine zone, 12 percent by Diesel-operated plants, and 83 percent in steam plants. Because of the great distance from consuming centers, the proportion of power produced in hydroelectric plants increased only 1 percent during the years 1939-44 inclusive, whereas Diesel-generated energy showed a decrease of 3 percent. The greatest increase in production of electricity was in steam plants. The overall increase in electric power production during this period was 26.7 percent.

Table 1 on page 2 indicates the approximate total production of electricity in million kilowatt-hours for the years 1939 through 1943, as published by the Committee on Statistics of the Finance Ministry, in plants operated by hydroelectric, steam, or Diesel power.

Table 2 shows the total installed capacity and the yearly production in kilowatt-hours for each Province and Territory for the years 1940 through 1944. A substantial increase is indicated for each year. As noted in the section on consumption of electricity, there was a notable decrease in the production of electric energy during the first 9 months of 1945.

Table 3 shows production statistics for 1940 through 1944, by Provinces, and the electric power production of each group of plants. The types of prime movers employed, and the total kilowatt capacity of each company, are indicated.

Complete data regarding production statistics of "Other privately owned plants" are unavailable. Many of the smaller plants in Argentina fail to keep detailed records. However, it is believed that the table gives complete information for all of the more important power plants in Argentina. It will be noted that production data for the year 1944 of the American and Foreign Power Co. holdings in the Provinces of Colon, Concepción, Jujuy, Parana, Rosario de Tala, and Tucuman are missing. These properties were expropriated during that year and, consequently, the records for the entire period are no longer available.

Consumption of Electricity

The consumption of electrical energy shows a yearly increase from 1938 to 1944, inclusive. However, the consumption as well as the production of electric energy in Argentina fell off during 1945. This decrease was caused by the various restrictions placed upon its use to save fuel. The restrictions, which went into effect in January 1945, were lifted the following October. Consumption figures for the re-

TABLE 3.—*Production of Electric Energy, 1940-44—Continued*

Province or Territory	Name of company [1]	Prime mover	Capacity (in kw.)	Production (in kilowatt-hours)				
				1940	1941	1942	1943	1944
Santa Fe	SUD	Hydro	530	2,498,430	2,224,690	3,375,440	3,203,850	3,494,320
....Do	Other	Thermal	5,573	.....	.....	.....	.....	.....
Total	.....	.....	81,739	52,107,637	52,876,738	54,081,815	54,954,423	221,061,888
San Juan	A. & F. P.	Thermal	3,944	11,558,480	12,012,020	12,011,650	13,176,920	8,871,901
....Do	A. & F. P.	Hydro	330	.....	.....	.....	.....	.....
....Do	Other	Thermal	178	.....	.....	.....	.....	.....
Total	.....	.....	4,452	11,558,480	12,012,020	12,011,650	13,176,920	8,871,901
San Luis	A. & F. P.	Thermal	1,563	1,531,600	1,609,340	1,677,380	1,755,480	1,761,653
....Do	....do	Hydro	210	1,068,080	1,158,090	1,386,650	1,467,900	1,425,493
....Do	SUD	Thermal	232	140,583	161,663	182,735	311,034	415,304
....Do	Other	....do	301	.....	.....	.....	.....	.....
Total	.....	.....	2,306	2,740,263	2,929,093	3,246,765	3,534,414	3,602,450
Santiago del Estero	SUD	Thermal	3,317	3,263,970	3,498,351	5,147,794	5,637,379	5,910,615
....Do	Other	....do	1,444	.....	.....	.....	.....	.....
Total	.....	.....	4,761	3,263,970	3,498,351	5,147,794	5,637,379	5,910,615
Santa Cruz	Other	Thermal	741	.....	.....	.....	.....	.....
Tucuman	A. & F. P.	....do	6,754	22,235,180	22,530,360	24,476,600	24,842,470	.....
		Hydro	6,000					
....Do	Other	Thermal	13,699	.....	.....	.....	.....	.....
Total	.....	.....	26,453	22,235,180	22,530,360	24,476,600	24,842,470	.....

[1] A. & F. P. American and Foreign Power Co. holdings. C.A.D.E. Cia. Argentina de Electricidad. SUIZO. Cia. Suizo Argentina de Electricidad S. A. ITALO. Italo Argentina de Electricidad. SUD. Cia. Sud Americana de Servicios Publicos. Other. Other privately-owned electric plants and cooperatives.

NOTE: Where no figures are shown, data are not available.

Digitized by Google

maining months of 1945 will undoubtedly show a substantial increase when they become available for dissemination.

The yearly consumption of electric energy for the years 1938 through 1944 was as follows:

	Million kilowatt-hours
1938	1,753.6
1939	1,871.9
1940	1,941.0
1941	2,024.6
1942	2,135.8
1943	2,257.2
1944	2,414.8

Distribution and Other Details

Electric Current Characteristics

When electric current was introduced into Argentina, only direct current of 220 volts (2-wires), and 2x220 volts (3-wires), was used for distribution. Later, with the rapid growth of cities and increased industrialization, the change-over to alternating current, 3-phase, 220/380 volts, 50 cycles, was made. The larger plants operating in Argentina today employ both direct current 2 x 220 volts, and alternating current, 220/380 volts, 50 cycles. Smaller plants are still using direct current.

Sockets and Plugs in use

About 95 percent of the electric sockets in use in Argentina are of the Edison screw type, and the remaining 5 percent are bayonet type. Round-pin plugs are generally used.

TABLE 4.—*Electric Power Plants in Operation in 1945*

Province or territory	Type of prime mover			
	Thermal	Hydro-electric	Steam	Total
Buenos Aires (including Federal Capital)	262	1	1	264
Entre Rios	68	.....	.....	68
Chaco	13	.....	.....	13
Corrientes	23	.....	.....	23
Cordoba	[1] 165	4	.....	[1] 169
Chubut	5	1	.....	6
Catamarca	[2] 6	.....	.....	[2] 6
Jujuy	[2] 8	1	.....	[2] 9
La Pampa	51	.....	.....	51
Los Andes	1	.....	.....	1
La Rioja	[1] 5	1	.....	[1] 6
Formosa	3	.....	.....	3
Misiones	4	.....	.....	4
Mendoza	18	.....	.....	18
Neuquen	2	2	.....	4
Salta	19	.....	.....	19
Rio Negro	9	1	.....	10
Santa Fe	181	1	.....	182
San Juan	[1] 6	.....	.....	[1] 6
Santa Cruz	5	.....	.....	5
San Luis	[1] 13	.....	.....	[1] 13
Santiago del Estero	26	.....	.....	26
Tucuman	[1] 24	.....	1	25
Total	917	12	2	931

[1] Includes three combination plants—Thermal-hydroelectric.

[2] Includes two combination plants—Thermal-hydroelectric.

Transmission System

Inasmuch as many of Argentina's power plants are isolated and small, an interconnected transmission system throughout the country does not now exist. However, at a later date, under the extensive electrification plans of the Government, a grid system in certain areas of the country is proposed.

Rural Electrification

There are no rural electrification projects in progress in Argentina and, insofar as can be ascertained, none are being planned at this time.

Power Plants (General)

Installed Capacity of Power Plants

The approximate installed capacity of Argentina's electric power plants in 1944 was 832,183 kilowatts. Of this amount 31,000 kilowatts were produced in hydroelectric plants which are located principally in the Provinces of Cordoba, Mendoza, and Tucuman. The Province of Buenos Aires, in which is located the City of Buenos Aires, has an installed capacity of 602,517 kilowatts, while the Provinces of Santa Fe and Cordoba have installed capacities of 81,866 and 60,169 kilowatts, respectively.

Number and Type of Power Plants

In 1945, there were 931 power plants supplying electric energy for domestic and industrial purposes. Table 4 shows the types and number of centrals in the various Provinces and Territories of Argentina in 1945. There are, in addition to this list, hundreds of small cooperative and privately owned power units and emergency stand-bys scattered throughout the country for which accurate statistics are not available.

TABLE 5.—*Operating Statistics of American and Foreign Power Co. Holdings, 1942–44*

Item	1942	1943	1944
Installed generating capacity kilowatts	172,252	171,896	153,180
Output, including purchased power . . . thousand kilowatt-hours	324,392	350,674	336,082
Communities served . number	167	166	157
Population served . number	2,631,000	2,678,000	2,501,000
Customers . . number	288,955	300,110	273,107

TABLE 6.—*Current Supplied to Buenos Aires, 1942 and 1943*

Item	1942	1943
City of Buenos Aires		
Electric energy sold . . kilowatt-hours	792,387,000	820,998,000
Connected load . . kilowatts	1,097,669	1,140,379
Customers . . number . .	464,641	481,764
Province of Buenos Aires		
Electric energy sold . . kilowatt-hours	539,283,000	577,251,000
Connected load . . kilowatts	641,995	647,846
Customers . . number . .	228,365	239,521

Power Plants (Groupings & Names)

Gas-Powered Plant

The only gas-powered generating station in Argentina is in Comodoro Rivadavia, in the Territory of Chubut, which is also the location of the country's most important petroleum deposits. This station is operated by Yacimientos Petroliferos Fiscales.

Electric Power Companies

Argentina's power companies are divided into four groups, as follows:

(1.) American and Foreign Power Co. holdings.

(2.) Cia. Argentina de Electricidad (C.A.D.E.), Cia: Italo Argentina de Electricidad (Italo) holdings, and Cia: Suizo Argentina de Electricidad, S.A. (SUIZO) holdings.

(3.) Cia. Sud Americana de Servicios Publicos, S.A. holdings.

(4.) Other privately owned electric plants and cooperatives.

In 1944, 57.4 percent of the electric energy produced in Argentina—3,118,600,000 kilowatt-hours—was generated in plants operated by Cia. Argentina de Electricidad. The total production of these plants reached 1,788,600,000 kilowatt-hours during that year. The American and Foreign Power Co. holdings produced slightly more than one-half the number of kilowatt-hours generated by the plants of the Cia. Italo Argentina de Electricidad. The respective figures for these two groups were 373,386,000 kilowatt-hours (12 percent of total energy) and 614,426,000 kilowatt-hours (19.7 percent).

All other privately owned centrals and cooperatives generated a total of 342,188,000 kilowatt-hours, or 10.9 percent of the country's electrical output in 1944.

Attention is called to the fact that this figure for total Argentine output differs somewhat from the total shown in table 2. As previously explained, complete statistics are unavailable for many of the small privately owned plants, as indicated in table 3.

American and Foreign Power Co. holdings.—The American and Foreign Power Co. holdings serve, with electric power, light, transportation, water, and ice plants, 157 communities having a combined population of 2,501,000.

As of December 31, 1944, the following were subsidiaries of the company in Argentina:

Cia. Central Argentina de Electricidad S.A.

Electricidad de Alta Gracia.

Cia. de Electricidad de los Andes, S.A.

Cia. de Electricidad del Este Argentino, S.A.

Cia. de Electricidad del Norte Argentino, S.A.

Cia. Hidro-Electricidad de Tucuman.

Digitized by Google

Tranvias Electricos de Tucuman, S.A.

Cia. de Electricidad del Sud Argentino, S.A.

Operating statistics for the American and Foreign Power Co. holdings in Argentina for the years 1942, 1943, and 1944 appear in table 5.

Cia. Argentina de Electricidad (C. A. D. E.).—This company is incorporated in Argentina. In November 1936, it acquired from Compania Hispano-Americana de Electricidad S.A. (Chade) the concessions, plants, and real and personal property located in Argentina following passage of an ordinance by the City of Buenos Aires which required public utilities operating in that city to be incorporated in Argentina, or to transfer their properties and concessions to an Argentine company.

Table 6 shows statistics for this company, indicating the current supplied to the City of Buenos Aires as well as that supplied to the Province of the same name.

Cia. Italo-Argentina de Electricidad.—In 1911, the Cia. Italo-Argentina de Electricidad was established under the laws of Argentina. In 1928, the company concluded a 25-year agreement with the Province of Buenos Aires (renewable at the company's option for a further period of 25 years), which granted it the right to use any public roads in the Province which are under the jurisdiction of the Provincial Government for the construction and maintenance of transmission lines, and all the auxiliary equipment necessary for the production and distribution of electricity to municipalities.

This company serves a population of 3,200,000 and furnishes a large part of the electrical energy consumed in the City of Buenos Aires and the surrounding districts. The distributing system of its coal and oil steam turbine plants includes 3,097 miles of transmission lines. At the end of 1944, the company's plants had a connected load of more than 500,000 kilowatts, which included residential and industrial lighting, and also street lighting and light and power for the Port of Buenos Aires.

In 1943, the company served 150,748 customers, while in 1944 the number of customers had increased to 157,633. The installed capacity of the power plant was 489,531 kilowatts in 1943, and it produced 447,623,104 kilowatt-hours, increasing to 517,271 kilowatts and 447,623,104 kilowatt-hours, respectively, in 1944.

Cia. Suizo Argentina de Electricidad.—Cia. Suizo Argentina de Electricidad is owned by Swiss and Argentine capital and operates 20 power centrals in the northeastern section of Argentina.

Cia. Sud Americana de Servicios Publicos.—This company operates 68 power plants in Argentina, the total annual production of which reached slightly over 35,000,000 kilowatt-hours in 1945. In 1928, United States interests purchased this group of plants, but disposed of them some years later. The present owner is a Chilean.

Extensive Development Planned by Government

Occasionally announcements have appeared in the press with reference to the Government's intention to develop all sources of power in Argentina in an effort to relieve the country's reliance on imports of foreign fuels. On May 25, 1946, the Bureau of State Electric Power Plants published an advertisement in an Argentine paper announcing its goal in developing the country's electric power potentials. Details of the plan, however, were lacking. Expropriation of a number of power plants owned by foreign capital has already taken place.

Previous announcements claimed that the hydroelectric potentials in the coastal areas, including the Provinces of Buenos Aires, Santa Fe, and Entre Rios, and the Andean region, where Mendoza is the most important Province, will be developed by the Government. Early in 1946, construction of a hydroelectric plant was started on the Mendoza River at Lujan de Cuyo.

In the 1945-46 annual report of the Cia. Italio Argentina de Electricidad reference is made to the Government's plans for the development of hydroelectric power, and the following appears with reference to the Salto Grande scheme:

"Regarding our present Concession Contract, one of the clauses of which imposes on the company the obligation of maintaining the plant in such condition as will enable it to cope with whatever demand may arise at any moment, we would draw attention to our concern about ascertaining the possibilities of using hydraulic power in this country. From the preliminary investigations made, it is clear that only Salto Grande on the River Uruguay would be of any interest for the purpose of providing electricity by the known generating and carrying systems.

"This project, a very costly one requiring the investment of a considerable amount of capital, would be subject to the unpredictable contingencies inherent in all hydraulic works of such magnitude, would involve the instalation of transmission lines entailing heavy upkeep by reason of their great length and would require the utilization of thermo-electric power stations having ample reserve generating capacity in view of the irregular flow of the river.

"Only as the result of the study of a construction project prepared by firms having long experience in hydraulic and electrical engineering, would it be possible to estimate the cost and the best method of turning to profitable use the electricity to be produced.

"It may be anticipated, therefore, that for many years to come the supply of electricity to the Capital will be produced exclusively by means of thermo-electric generation."

List of Argentine Power Plants

In the following list of Argentine power plants, table 7 and 7a, the plants owned or controlled by the major holding companies are shown separately from the centrals which are municipally, cooperatively, or privately owned. These latter plants, under the general classification of "Other privately owned electric plants and cooperatives," are grouped by Provinces. The name of the owner is shown when available.

Plants supplying alternating current are readily discernible from those furnishing direct current, since the latter indicates no frequency.

Ownership is indicated as follows: P, private; M, municipal; C, cooperatively owned; and G, National Government.

Digitized by Google

TABLE 7.—*Current Characteristics of Argentine Electric Power Distribution Systems*

[American and Foreign Power Co. holdings]

Location	Name of company	Ownership	Primary voltage	Secondary voltage	Phase	Cycle
Alta Gracia, Cordoba	S. A. Electricidad de Alta Gracia	P	6,300	220/380	3ph	50
				2x220	3w	.....
Alto Alegre, Cordoba	Cia. Central Argentina de Electricidad	P	.....	2x220	3w	.....
Armstrong, Santa Fe	.....do	P	.....	2x220	3w	.....
Arribenos, Buenos Aires	Cia. de Electricidad del Sud Argentino	P	.....	2x220	3w	.....
Ascension, Buenos Aires	.....do	P	.....	2x220	3w	.....
Balnearia, Cordoba	Cia. Central Argentina de Electricidad	P	.....	2x220	3w	.....
Baradero, Buenos Aires	Cia. de Electricidad del Sud Argentino	P	132,000	220/380	3ph	50
				2x220	3w	.....
Bell Ville, Cordoba	Cia. Central Argentina de Electricidad	P	.....	2x220	3w	.....
Bragado, Buenos Aires	Cia. de Electricidad del Sud Argentino	P	.....	.....	.....	.....
Campana, Buenos Aires	.....do	P	10,000	2x220	3w	50
Canada de Gomez, Santa Fe	Cia Central Argentina de Electricidad	P	.....	2x220	3w	.....
Capitan Sarmiento, Buenos Aires	Cia. de Electricidad del Sud Argentino	P	.....	2x220	3w	.....
Carhue, Buenos Aires	.....do	P	.....	2x220	3w	.....
Cascallares, Buenos Aires	.....do	P	.....	2x220	3w	.....
Chascomus, Buenos Aires	.....do	P	.....	2x220	3w	.....
Chivilcoy, Buenos Aires	.....do	P	10,000–2,300	220/380	3ph	50
				2x220	3w	.....
Colon, Buenos Aires	.....do	P	.....	2x220	3w	.....
Colon, Entre Rios	Expropriated by Provincial Government	G	.....	2x220	3w	.....
Concepcion, Tucuman	.....do	G	.....	2x220	3w	.....
Concordia, Entre Rios	Cia. de Electricidad del Este Argentino	P	.....	2x220	3w	.....
Cordoba, Cordoba	Cia. General de Electricidad de Cordoba	P	23,000–13,200	220–220/380	1 & 3	50
			6,500–5,000	220–220–220	1 & 3	60
			2,300/4,000	2x220	3w	
..do	Cia. Luz y Fuerza Motriz de Cordoba	P	10,000	110/220	3ph	60
				220	1ph	60
Coronel Dorrego, Buenos Aires	Cia. de Electricidad del Sud Argentino	P	.....	2x220	3w	.....
Crespo, Entre Rios	Cia. de Electricidad del Este Argentino	P	.....	2x220	3w	.....
Cruz Alta, Cordoba	Cia. Central Argentina de Electricidad	P	.....	2x220	3w	.....
Devoto, Cordoba	Cia. Central Argentina de Electricidad	P	.....	2x220	3w	.....
Diamante, Entre Rios	Cia de Electricidad del Este Argentino	P	13,200	220/380	3ph	50
Exaltacion de la Cruz, Buenos Aires	Cia. de Electridicad del Sud Argentino	P	.....	2x220	3w	.....
General Arenales, Buenos Aires	.....do	P	.....	2x220	3w	.....
General Cabrera, Cordoba	Cia. Central Argentina de Electricidad	P	.....	2x220	3w	.....
General Conesa, Buenos Aires	Cia. de Electricidad del Sud Argentino	P	.....	2x220	3w	.....
General Paz, Santa Fe	.....do	P	.....	2x220	3w	.....
General Pico, La Pampa	.....do	P	.....	2x220	3w	.....
General Rojo, Buenos Aires	.....do	P	.....	.....	.....	.....
General Uriburu, Buenos Aires	.....do	P	10,000	220/380	3ph	50
				2x220	3w	.....
General Villegas, Buenos Aires	.....do	P	.....	2x220	3w	.....
Gualeguay, Entre Rios	Cia. de Electricidad del Este Argentino	P	.....	2x220	3w	.....
Gualeguaychu, Entre Rios	.....do	P	.....	2x220	3w	.....
Henderson, Buenos Aires	Cia. de Electricidad del Sud Argentino	P	.....	2x220	3w	.....
Hernando, Cordoba	Cia. Central Argentina de Electricidad	P	.....	2x220	3w	.....
Juarez, Buenos Aires	Cia. de Electricidad del Sud Argentino	P	.....	2x220	3w	.....
Jujuy, Jujuy	Expropriated by Provincial Government	G	.....	2x220	3w	.....
Junin, Buenos Aires	Cia. de Electricidad del Sud Argentino	P	13,200	220/380	3ph	50
				2x220	3w	.....
Laboulaye, Cordoba	Cia. Central Argentina de Electricidad	P	.....	2x220	3w	.....
La Carlota, Cordoba	.....do	P	.....	2x220	3w	.....
Laguna Paiva, Santa Fe	.....do	P	.....	2x220	3w	.....
Las Rosas, Santa Fe	.....do	P	.....	2x220	3w	.....
Las Sierras, Cordoba	.....do	P	22,000–13,200	220	1ph	50
			5,000–10,000			
			2,300	220/380	3ph	.....
Las Varillas, Cordoba	Cia. Central Argentina de Electricidad	P	.....	2x220	3w	.....
Loberia, Buenos Aires	Cia. de Electricidad del Sud Argentino	P	2,300	220/380	3ph	50
				2x200	3w	.....
Marcelino Ugarte, Buenos Aires	Cia. de Electricidad del Sud Argentino	P	.....	2x200	3w	.....
Marcos Juarez, Cordoba	Cia. Central Argentina de Electricidad	P	13,200	220/380	3ph	50
				2x200	3w	.....
Mar del Plta. Buenos Aires	Cia. de Electricidad del Sud Argentino	P	13,200	220–220/380	3ph	50
				2x200	3w	.....
Medanos, Buenos Aires	.....do	P	.....	2x220	3w	.....
Mendoza, Mendoza	Cia. de Electricidad de los Andes	P	13,200	220	.....	.....
			5,000	220/380	3ph	50
Mercedes, Buenos Aires	Cia. de Electricidad del Sud Argentino	P	10,000	220/380	3ph	50
Bragado, Buenos Aires	.....do	P	10,000	220/380	3ph	50
				2x220	3w	.....
Mercedes, San Luis	Cia. de Electricidad de los Andes	P	2,300/4,000	220/380	3ph	50
				2x220	3w	.....
Moises Ville, Santa Fe	Cia. Central Argentina de Electricidad	P	.....	2x220	3w	.....
Necochea, Buenos Aires	Cia. de Electricidad del Sud Argentino	P	2,300–4,000	220/380	3ph	50
Noetinger, Cordoba	Cia. Central Argentina de Electricidad	P	.....	2x220	3w	.....
Nueve de Julio, Buenos Aires	Cia. de Electricidad del Sud Argentino	P	.....	2x220	3w	.....
Oran, Salta	Cia. de Electricidad del Norte Argentino	P	.....	2x220	3w	.....
Parana, Entre Rios	Expropriated by Provincial Government	G	13,200	220/380	3ph	50
				2x220	3w	.....
Passo, Buenos Aires	Cia. de Electricidad del Sud Argentino	P	.....	2x220	3w	.....
Patagones, Buenos Aires	.....do	P	.....	2x220	3w	.....
Paz, Santa Fe	.....do	P	.....	2x220	3w	.....
Pehuajo, Buenos Aires	.....do	P	.....	2x220	3w	.....
Pilar, Cordoba	Cia. Central Argentina de Electricidad	P	.....	2x220	3w	.....
Pilar, Santa Fe	.....do	P	.....	2x220	3w	.....
Quequen, Buenos Aires	Cia. de Electricidad del Sud Argentino	P	2,300–4,000	220/380	3ph	50
Ramallo, Buenos Aires	.....do	P	.....	2x220	3w	.....
Rauch, Buenos Aires	Cia. de Electricidad del Sud Argentino	P	.....	2x220	3w	.....
Rawson, Buenos Aires	.....do	P	.....	2x220	3w	.....
Resistencia, Chaco Territory	Cia. de Electricidad del Este Argentino	P	10,000	220/380	3ph	50
				220		
				2x220	3w	.....
Rio Cuarto, Cordoba	Cia. Central Argentina de Electricidad	P	.....	2x220	3w	.....
Rio Segundo, Cordoba	.....do	P	13,200	220/380	3ph	50
Rivadavia, Buenos Aires	Cia. de Electricidad del Sud Argentino	P	.....	2x220	3w	.....
Rosario Tala, Entre Rios	Expropriated by Provincial Government	G	.....	2x220	3w	.....
Saladillo, Buenos Aires	Cia. de Electricidad del Sud Argentino	P	2,300/4,000	220/380	3ph	50
				2x220	3w	.....
Salta, Salta	Cia. de Electricidad del Norte Argentino	P	2,300/4,000	220/380	3ph	50
				2x220	3w	.....
San Andres de Giles, Buenos Aires	Cia. de Electricidad del Sud Argentino	P	.....	2x220	3w	.....
San Carlos Centro and San Carlos Sud, Santa Fe	Cia. Central Argentina de Electricidad	P	2,300	.....	.....	.....
San Francisco, Cordoba	.....do	P	2,300	220/380	3ph	50
				2x220	3w	.....

Digitized by Google

TABLE 7.—*Current Characteristics of Argentine Electric Power Distribution Systems*—Continued

[American and Foreign Power Co. holdings—continued]

Location	Name of company	Ownership [1]	Primary voltage	Secondary voltage	Phase	Cycle
San Geronimo, Santa Fe	Cia. Central Argentina de Electricidad	P		220	2w	.....
San Juan, San Juan	Cia. de Electricidad de los Andes	P	10,000	220/380	3ph	50
				220	1 & 3 ph	.....
San Luis, San Luis	....do	P		2x220	3w	.....
San Nicolas, Province of Buenos Aires	Cia. de Electricidad del Sud Argentino	P	13,200	220/380	3ph	50
					3w	.....
Cepeda, Province of Buenos Aires	....do	P	13,200	220/380	3ph	50
Empalme Villa Constitucion, Province of Buenos Aires	....do	P	13,200	220/380	3ph	50
Godoy, Province of Buenos Aires	....do	P	13,200	220/380	3ph	50
La Vanguardia, Province of Buenos Aires	....do	P	13,200	220/380	3ph	50
Rueda, Province of Buenos Aires	Cia. de Electricidad del Sud Argentino	P	13,200	220/380	3ph	50
Sargento Cabral, Province of Buenos Aires	....do	P	13,200	220/380	3ph	50
Villa Constitucion, Province of Buenos Aires	....do	P	13,200	220/380	3ph	50
San Pedro, Province of Buenos Aires	....do	P		2x220	3w	.....
San Rafael, Mendoza	Cia. Electricidad de los Andes	P	10,000	220/380	3ph	50
Santa Fe, Santa Fe	Cia. Central Argentina de Electricidad	P	6,600	220/380	3ph	50
				2x220	3w	.....
Suipacha, Buenos Aires	Cia. de Electricidad del Sud Argentino	P	13,200	220/280	3ph	50
Sunchales, Santa Fe	Cia. Central Argentina de Electricidad	P		2x220	3w	.....
Tancacha, Cordoba	....do	P		220/380	3ph	50
Tandil, Buenos Aires	Cia. de Electricidad del Sud Argentino	P	10,000	220/380	3ph	50
				2x220	3w	.....
Teodolina, Santa Fe	....do	P		2x220	3w	.....
				220/380	3ph	50
Tucuman, Tucuman	Expropriated by Provincial Government	G	13,200–4,400	220	3ph	50
				2x220	3w	.....
Viedma, Rio Negro	Cia. de Electricidad del Sud Argentino	P		2x220	3w	.....
Vila, Santa Fe	Cia. Central Argentina de Electricidad	P		2x220	3w	.....
Villa del Rosario, Cordoba	....do	P		2x220	3w	.....
Villa Maria, Cordoba	....do	P	13,200	220/380	3ph	50
Carcano, Cordoba	....do	P	13,200	220/380	3ph	50
James Craik, Cordoba	....do	P	13,200	220/380	3ph	50
Morrison, Cordoba	....do	P	13,200	220/380	3ph	50
Villa Nueva, Cordoba	....do	P	13,200	220/380	3ph	50

[Cia. Argentina de Electricidad (C.A.D.E.), Cia. Italo Argentina de Electricidad (ITALO), and Cia. Suizo Argentina de Electricidad S.A. holdings]

			27,500	2x225	3w	.....
			13,000	550	3w	.....
Federal Capital Buenos Aires	Cia. Argentina de Electricidad	P	6,500	1,100	3w	.....
			12,500	3x225	3ph	50
			6,300	2x225/390	3ph	50
			6,600	2x220	3w	.....
Province of Buenos Aires	....do	P	13,000	550	3w	.....
District of LaPlata			5,600	3x220/380	3ph	50
District of Avellaneda	....do	P	27,500	500	3w	.....
			13,000	3x220	3ph	50
				500	3w	.....
District of 4 de Junio	....do	P	13,000	3x220	3ph	50
			6,500	3x220/380	3ph	50
District of E. Echeverria	....do	P				
District of General Rodriguez	....do	P				
District of General Sarmiento	....do	P				
District of Marcos Paz	....do	P	13,000	3x220/380	3ph	50
District of Merlo	....do	P				
District of Moreno	....do	P				
District of Pilar	....do	P				
District of San Vicente	....do	P				
			27,500			
District of San Isidro	....do	P	13,000	2x220/380	3ph	50
			3,300			
District of Seis de Setiembre	....do	P	27,500	3x220/380	3ph	50
			13,000			
District of Las Conchas	....do	P	13,000	3x220	3ph	50
District of San Fernando	....do	P	3,300	3x220/380	3ph	50
			27,500	3x220	3ph	50
District of Vincente Lopez	....do	P	13,000	3x220/380	3ph	50
			3,300			
District of Coronel Brandsen	....do	P		2x220	3w	.....
District of Las Heras	....do	P				
District of Canuelas			13,000	2x220	3w	.....
				3x220/380	3ph	4w 50
District of Magdalena				2x220	3w	.....
				3x220/380	3ph	50
District of Almirante Brown	Cia. de Electricidad de la Province de Buenos Aires	P				
District of F. Varela	....do	P		3x220	3ph	50
District of Lomaz de Zamora	....do	P	13,000	3x220/380	3ph	50
District of La Matanza	....do	P				
District of Quilmes	....do	P				
			27,500	3x220	3ph	50
District of General San Martin			13,000	3x220/380	3ph	50
			3,300			
Gobernacion de la Pampa:						
General Acha	Empresa Electrica de Bahia Blanca	P	2x220	2x220	3w	dc
Bahia Blanca	....do	P	3x6,600	3x380/220	3ph	50
Federal Capital:						
Buenos Aires	Cia. Italo Argentina de Electricidad	P	27,500	6,875	3ph	50
			6,875	225–390	3w	.....
Avellaneda 4 de Junio	....do		6,875	225–390	3ph	50
Quilmes	....do	P	6,875	225–390	3ph	50
Lomas de Zamora	....do	P			3w	.....
Pergamino, Buenos Aires	Cia. de Electricidad de Pergamino	P	3,610	2x220	3w	.....
Dolores, Buenos Aires	Cia. de Electricidad de Dolores	P	2x220	2x220	3w	.....
Balcarce, Buenos Aires	Cia. Suizo Argentina de Electricidad S. A.	P	3,000: 2x220	220/380	3w	50
Los Pinos, Buenos Aires	....do	P	3,000	220/380	3ph	50
Chacabuco, Buenos Aires	Cia. Suizo Argentina de Electricidad S. A.	P	3,000; 2x220	220/380	3w	.....
Saenz Pena, Buenos Aires	....do	P	3,000	220/380	3ph	50
Quitilipi, Territory Chaco	....do	P	33,000/3,000	220/380	3ph	50
Machagai, Territory Chaco	....do	P	33,000/3,000	220/380	3ph	50
Pte. Plaza, Territory Chaco	....do	P	33,000/3,000	220/380	3ph	50
Charata, Territory Chaco	....do	P	33,000/3,000	220/380	3ph	50
General Pinedo, Territory Chaco	....do	P	33,000/3,000	220/380	3ph	50

Digitized by Google

TABLE 7.—*Current Characteristics of Argentine Electric Power Distribution Systems*—Continued

[Cia. Argentina de Electricidad (C.A.D.E), Cia. Italo Argentina de Electricidad (ITALO), and Cia. Suizo Argentina de Electricidad S.A. holdings—continued]

Location	Name of company	Ownership [1]	Primary voltage	Secondary voltage	Phase	Cycle
Las Brenas, Territory Chaco	Cia. Suizo Argentina de Electricidad S. A.	P	33,000/3,000	220/380	3ph	50
Corzuela, Territory Chaco	do	P	33,000/3,000	220/380	3ph	50
Campo Largo, Territory Chaco	do	P	33,000/3,000	220/380	3ph	50
Anatuya, Santiago del Estero	do	P	2x220	2x220	3w	.....
Tostado, Santa Fe	do	P	2x220	2x220	3w	.....
Reconquista, Santa Fe	do	P	2x220	2x220	3w	.....
Formosa, Formosa	do	P	3,000	220/380	3ph	50
Mercedes, Corrientes	do	P	3,000; 2x220	220/380	3ph	50
Bella Vista, Corrientes	do	P	2x220	2x220	3w	.....
Santa Lucia, Corrientes	do	P	2x220	2x220	3w	.....
Curuzu, Cuatia, Corrientes	do	P	220/380	220/380	3ph	50
Libres, Corrientes	do	P	2x220	2x220	3w	.....
Alvear, Corrientes	do	P	2x220	2x220	3w	.....
La Cruz, Corrientes	do	P	2x220	2x220	3w	.....
Chajare, Corrientes	do	P	2x220	2x220	3w	.....
Villaguay, Entre Rios	do	P	2x220	2x220	3w	.....
San Salvador, Entre Rios	do	P	2x220	2x220	3w	.....
La Paz, Entre Rios	do	P	2x220	2x220	3w	.....

[Cia. Sud Americana de Servicios Publicios, S. A. holdings]

Alberdi, Buenos Aires	Cia. Sud Americana de Servicios Pub. S. A.	P	2x235	220/440	3w	.....
Alcorta, Santa Fe	do	P	2x235	220/440	3w	.....
Alejandro, Cordoba	do	P	2x235	220/440	3w	.....
Alejo Ledesma, Cordoba	do	P	2x235	220/440	3w	.....
Alem, Buenos Aires	do	P	2x235	220/440	3w	.....
Arequito, Santa Fe	do	P	2x230	220/440	3w	.....
Arias, Cordoba	do	P	2x235	220/440	3w	.....
Artega, Santa Fe	do	P	2x235	220/440	3w	.....
Ayacucho, Buenos Aires	do	P	2x235	220/440	3w	.....
Buchardo, Cordoba	do	P	2x235	220/440	3w	.....
Canada Verde, Cordoba	do	P	2x235	220/440	3w	.....
Carlos Casares, Buenos Aires	do	P	2x235	220/440	3ph	50
			2,400	220/380	3w	.....
Carlos Tejedor, Buenos Aires	do	P	2x235	220/440	3w	.....
Carmen de Areco, Buenos Aires	do	P	2x235	220/440	3w	.....
Chanar Ladeado, Santa Fe	do	P	2x235	220/440	3w	.....
Coronda, Santa Fe	do	P	2x235	220/440	3w	.....
Coronel Pringles, Buenos Aires	do	P	2x235	220/440	3w	.....
Corral de Bustos, Cordoba	do	P	2x235	220/440	3w	.....
Cruz del Eje, Cordoba	do	P	2x235	220/440	3w	.....
Darregueira, Buenos Aires	do	P	2x235	220/440	3w	.....
El Trebol, Santa Fe	do	P	2x235	220/440	3w	.....
Firmat, Santa Fe	do	P	2x235	220/440	3w	.....
French, Buenos Aires	do	P	2x235	220/440	3w	.....
Frias, Santiago del Estero	do	P	2x235	220/440	3w	.....
Gaiman, Territory Chubut	do	P	2x225	220/440	3w	.....
General Alvear, Mendoza	do	P	2x235	220/440	3w	.....
General Belgrano, Buenos Aires	do	P	2x230	220/440	3w	.....
General Lamdrid, Buenos Aires	do	P	2x235	220/440	3w	.....
Guamini, Buenos Aires	do	P	2x235	220/440	3w	.....
Inriville, Cordoba	do	P	2x235	220/440	3w	.....
Isla Verde, Cordoba	do	P	2x235	220/440	3w	.....
Jobson (Vera), Santa Fe	do	P	2,400	220/380	3ph	50
Justo Daract, San Luis	do	P	2x235	220/440	3w	.....
Laborde, Cordoba	do	P	230	220	2w	.....
La Dulce, Buenos Aires	do	P	2x230	220/440	3w	.....
Laprida, Buenos Aires	do	P	2x235	220/440	3w	.....
Leones, Cordoba	do	P	2x235	220/440	3w	.....
Los Quirquinchos, Santa Fe	do	P	2x235	220/440	3w	.....
Los Surgentes, Cordoba	do	P	2x235	220/440	3w	.....
L. V. Lopez, Santa Fe	do	P	4,250	33 kv–12 kv	.....	.....
				220/380	3ph	50
Carcarana, Santa Fe	do	P	2,400	12 kv 220/380	3ph	50
Monte Maiz, Cordoba	do	P	2x235	220/440	3w	.....
Orense, Buenos Aires	do	P	2x235	220/440	3w	.....
Pascanas, Cordoba	do	P	230	220	2w	.....
Pellegrini, Buenos Aires	do	P	2x235	220/440	3w	.....
Peyrano, Santa Fe	do	P	2x235	220/440	3w	.....
Pueblo Irigoyen, Santa Fe	do	P	2x235	220/440	3w	.....
Puerto Madryn, T. Chubut	do	P	2x235	220/440	3w	.....
Salliquelo, Buenos Aires	do	P	2x235	220/440	3w	.....
San Cayetano, Buenos Aires	do	P	2x235	220/440	3w	.....
San Cristobal, Santa Fe	do	P	2x235	220/440	3w	.....
San Genaro, Santa Fe	do	P	2x235	220/440	3w	.....
San Jorge, Santa Fe	do	P	2x235	220/440	3w	.....
			2,400	220/380	3ph	50
San Juan de la Esquina, Santa Fe	do	P	235	220	2w	.....
			2,400	220/380	3ph	50
San Justo, Santa Fe	do	P	2x235	220/440	3w	.....
Santa Isabel, Santa Fe	do	P	2x235	220/440	3w	.....
Santiago del Estero, Santiago del Estero	do	P	2x235	220/440	3w	.....
			2,400	220/380	3ph	50
La Banda, Santiago del Estero	do	P	600	220/380	3ph	50
San Urbano, Santa Fe	do	P	2x235	220/440	3w	.....
Sastre, Santa Fe	do	P	2x235	220/440	3w	.....
Tres Arroyos, Buenos Aires	do	P	2x235	220/440	3w	.....
			2,400	220/380	3ph	50
Tres Lomas, Buenos Aires	do	P	2x235	220/440	3w	.....
Ucacha, Cordoba	do	P	2x235	220/440	3w	.....
Vedia, Buenos Aires	do	P	2x235	220/440	3w	.....
Vela, Buenos Aires	do	P	2x230	220/440	3w	.....
Vicuna Mackenna, Cordoba	do	P	2x235	220/440	3w	.....
Villa Canes, Santa Fe	do	P	2x235	220/440	3w	.....
Villa Dolores, Cordoba	do	P	2x235	220/440	3w	.....
W. Escalante, Cordoba	do	P	2x235	220/440	3w	.....
General Alvear, Mendoza	do	P	2x235	220/440	3w	.....
			4,000	220/380	3ph	50

Digitized by Google

TABLE 7a.—*Current Characteristics of Argentine Electric Power Distribution Systems*

[Other privately owned electric plants and cooperatives]

Location	Proprietor	Ownership [1]	Primary voltage	Secondary voltage	Phase	Cycle
Province of Buenos Aires:						
Acevedo	Esteban Tapella	P		225	2w	
Agustin Roca	Juan Federico Decarre	P		2x220	3w	
Alfonso	Mateo Oliver	P		2x220	3w	
Alsina	Domingo Cirigliano	P		220	2w	
Altamirano	Rodriguez Castel	P		2x220	3w	
Ameghino	Anton y Doro	P		2x225	3w	
Aparicio	Honorio I Zuele	P		2x220	3w	
Arenaza	Viuda de Arribalzago	P		2x220	3w	
Arrecifes	Municipality	M		2x225	3w	
Arroyo Corto	Martin Barutte	P		220	2w	
Arroyo Dulce	Americo Cola	P		2x220	3w	
Azucena	Rabel Hermanos	P		2x220	3w	
Azul	Cia. de Electricidad del Azul	P		2x220	3w	
Azuuenega	Alfredo Terren y Cia.	P		2x220	3w	
Baigorrita	Vicente A. Yapella	P		2x220	3w	
Banderalo	A. Forletti y Cia.	P		220	2w	
Barraondo	Carlos Castromano	P		2x220	3w	
Bellocq	Villarrica Abel	P		2x220	3w	
..Do	Abel Garcia	P		2x220	3w	
Blanca Grande	Desiderio Frida	P				
Blaquier	Domingo Lorenzotto	P		2x220	3w	
Bonifacio	T. Sosa	P		2x220	3w	
Bordenave	T. Sebastian	P		220	2w	
Bunge	Jose Gallo	P		2x220	3w	
Cabildo	Usina Electrica de Cabildo	P		2x220	3w	
Cambaceres	Jose Aramburu	P		2x220	3w	
Canada Seca	Abba Jose	P		2x225	3w	
Carlos Keen	Aniceto Gutierrez	P		220	2w	
Casbas	Perfecto Rodriguez	P		2x220	3w	
Caseros (Daireaux)	Cia. Comercial e Industrial	P		2x220	3w	
Castelli	Atilio Dubiano	P		2x220	3w	
Claraz	C. E. L. Claraz	P		220	2w	
Colonia Sere	Oroz Hermanos	P		2x220	3w	
Colonia No. 3	Carlos Bugni	P		2x220	3w	
Cte. N. Stamendi	Gonzalez y Cia.	P		2x220	3w	
Comodoro Py	Hugo Nusshold	P		2x220	3w	
Coronel Granda	Buzzolini Montani	P		2x220	3w	
Coronel Nom	L. E. Oertlin	P		2x220	3w	
Coronel Suarez	Enrique Betnaza	P		2x220	3w	
Coronel Vidal		P		2x220	3w	
Charlone	Juan Mut	P		220	2w	
Chiclana	J. N. Carol	P		2x220	3w	
Chillar	F. Gratas y Pagolla	P		2x220	3w	
Chivilcoy	Cia. Electrica de Chivilcoy	P		2x220	3w	
Cucha Cucha	Juan Demarco	P		2x220	3w	
De la Garma	Dolindo Grasa	P		2x220	3w	
Dolores	Cia. Electricidad de Dolores	P		2x220	3w	
Dudignac	F. Iturriza y Cia.	P		2x220	3w	
Dufaur	Barreto y L'Aoste	P		220	2w	
El Triunfo	Juan Carri	P		2x220	3w	
El Paraiso	Jose Villar	P		2x220	3w	
Elordi	Humberto Cardman	P		220	2w	
El Pensamiento	Santos W. Gonzalez	P		220	2w	
El Recado	Jaime Cameiron	P		2x220	3w	
Ernestina	Humberto Torrizano	P		2x220	3w	
Espartillar	M. Chaparra	P		220	2w	
Espigas	Guido Harmanos	P		2x220	3w	
Estela	Carlos Simones	P				
Eubuco	Antonio Deheza	P		2x220	3w	
Fair	Juan Orma	P		2x220	3w	
Fontezuela	Raimundo Tel	P		2x220	3w	
Fortin Olavarria	Empresa Pampera Luz y Fuerza	P		2x220	3w	
F. Madero	Vignocchi y. Cia.	P		2x220	3w	
Galvan	Antonio Giori	P		2x220	3w	
Gardey	Quinto Bartolacci	P		2x220	3w	
General Conesa	Cia. de Luz y Industrias	P		2x220	3w	
General Guido	Carlos Cislaghi	P		2x220	3w	
General Lavalle	Jorge Nicodem	P		2x220	3w	
General Madariaga	L. Schwab	P		2x220	3w	
General Pinto	Buzzalino y Montani	P		2x220	3w	
General Piran	Perez Bruno	P		2x220	3w	
General Tiran	Etchsgaray y Cia.	P		2x220	3w	
Germania	Buzzalino y Montani	P		2x220	3w	
Giardini	Alberto Cotelo	P		2x220	3w	
Graciarena	Francisco Amoroso	P		220	2w	
Gonzalez Chaves	Obras Sanitarias de la Nacion	G		220	3ph	50
Goyena	Domingo Marra	P		2x220	3w	
Guerrico	H. Araguetti	P		2x220	3w	
Hinojo	Sociedad Anonima de Luz y Fuerza	P		2x220	3w	
Hortensia	Atanasio Jivu	P		2x220	3w	
Huanquelen	Carbone Hermanos	P		2x220	3w	
Huetel	Jose Manzanares	P		2x220	3w	
Ines Indart	Icetta y Game	P		2x220	3w	
Irala	Manuel Garcia	P		2x220	3w	
Iterregui		P		2x220	3w	
J. B. Auguey	Ernesto Marullo	P		2x220	3w	
J. E. Barra	Gazzolino Kerber	P		2x220	3w	
J. V. Cilley	Wenceslao Garcia	P		2x220	3w	
J. N. Fernandez	A. Bergdolt	P		2x220	3w	
J. A. Guisasola	Rago y Grasa	P		2x220	3w	
J. A. Pradere	Elias Heredia	P		2x220	3w	
La Aurora	Solabarrieta Hermanos	P		2x220	3w	
La Dorita	Osvaldo Corral	P		2x220	3w	
Labarden	M. Lluch	P		2x220	3w	
Lago Epecuen	Sociedad Anonima Termas Epecuen	P		2x220	3w	
La Luisa	Damasa Vda. de Lamas	P		2x220	3w	
La Noria	Antonio Molino	P		2x220	3w	
Las Juanitas	Esteban Sabransky	P		2x220	3w	
Las Martinetas	Juan Cuello	P		2x220	3w	
Las Parras (Parvas)	Patricio Cormiek	P		2x220	3w	
Las Toscas	Clements Cianoth	P		2x220	3w	
La Zanca	Severino Hernan	P		2x220	3w	
Lertora	Jose Brandono	P		2x220	3w	
Lezema	Disanto y D'Auro	P		2x220	3w	
Lima	Brun Capello y Cia.	P		2x220	3w	

Digitized by Google

TABLE 7a.—*Current Characteristics of Argentine Electric Power Distribution Systems*—Continued

[Other privately owned electric plants and cooperatives—continued]

Location	Proprietor	Ownership [1]	Primary voltage	Secondary voltage	Phase	Cycle
Province of Buenos Aires—Continued						
Lincoln	Municipality	M		2x220	3w	
Lobos	Tagliero Hermanos	P	6600	2x220	3ph	50
Lopez Camelo	Gregorio Tagernini	P		2x220	3w	
Los Cardales	Roque del Marmol	P		220	2w	
Los Toldos	J. B. Gilbert	P		2x220	3w	
Lujan	Sociedad Anonima Electricidad de Lujan	P		2x220	3w	
Manuel Ocampo	Cremanti y Lavazzano	P		220	2w	
M. Buratovich	Alfredo Rabitti y Cia.	P		220	2w	
Maza	Nielsen Hermanos	P		2x220	3w	
Membrillar	Jose Bruman	P		2x220	3w	
Meridiano V.	U. E. Meridiano V	P		2x220	3w	
Miramar	Allende y Cia.	P		2x220	3w	
Mones Cazon	Vitangeli y Cutini	P		2x220	3w	
Monte	Miguel R. Igusquiza	P		2x220	3w	
Moquehua	Carcavallo & Hijo	P		2x220	3w	
Moscon	Antonio Hami	P		2x220	3w	
Mouras	Marcelino Herrera	P		220	2w	
Munoz	Marcos Martijena	P				
Navarro	F. E. Martinez	P		2x220	3w	
Necochea	C. A. E.	C				
Norberto Riestra	Baratelli Geronimo	P		2x220	3w	
O'Brien	B. Etcheverria y Cia.	P		220	2w	
O'Higgins	B. Etchechoury	P		2x220	3w	
Olavarria	Sociedad Anonima Luz Electrica	C	6,000	220/380	3ph	50
Ombueta	Renee Navarro	P		220	2w	
Opendoor	Carlos D'Lorenzi	P		2x220	3w	
Ordoqui	Guillermo Walter	P		2x220	3w	
Oriente	San Llorenti y Brunardd	P	6,600	220/380	3ph	50
Pasteur	E. F. Romero	P		2x220	3w	
Patricios	Carlos Bugni	P		2x220	3w	
Perez Millan	Alberto Massot	P		2x220	3w	
Pergamino	Cia. Electricidad de Pergamino	P	3,700	2x220	3ph	50
Pila	Di Santo y Martino	P		2x220	3w	
Pirovano		P		220x2	3w	
Pla	Enrique Klein	P		2x220	3w	
Puan	Schmidt y Cia.	P		2x220	3w	
Pueblo San Jose	Strevensky Hermanos	P		2x220	3w	
Punta Alta	Cooperativa de Electricidad	C		2x220	2w	
Quenoma	Carmelo Cervino	P		2x220	3w	
Rafael Obligado	Sucesion Christin (Christin Estate)	P		2x220	3w	
Ramallo	Jose Yantorno	P		2x220	3w	
Ramon Santamarina	F. Valentini	P		2x220	3w	
Recreo	Lorenzo Blanch	P				
Rivera	Domingo Estegug	P		2x220	3w	
Roberts	Carlos Balzola	P		220	2w	
Rojas	Bertuletti y Cia.	P		2x220	3w	
Roque Perez	Barnardo Tagliero	P		2x220	3w	
Saavedra	R. A. Stinco	P		2x220	3w	
Salazar	J. B. Garro	P		220	3w	
Saldungaray	Municipality	M		2x220	3w	
San Agustin	Eliseo Gonzalez	P		2x220	3w	
San Antonio de Areco	Cooperative	C		2x220	3w	
San Jose	Strevensky Estate, Sucesion Strevensky	P				
San Mauricio	Pedro Cattaneo	P		220	2w	
Santa Eldeodora	Juan Campelo	P		2x220	3w	
Santa Lucia	Buffa y Cia.	P		2x220	3w	
Santa Luisita (Luisa)	Uberti Brazzo	P		2x220	3w	
Sierra Ventana		P		2x220	3w	
Stroeder	Valtierra Hermanos	P		2x220	3w	
Suipacha	Sociedad Anonima Electrica	P		2x220	3w	
Tapalque	Sociedad Anonima de Electricidad de Tapalque	P		2x220	3w	
Timote	F. Russo e Hijos	P		220	2w	
Todd	Santiago Picatto	P		220	2w	
Tornquist	Municipal	M		2x220	3w	
Toro	J. N. Perosio	P		220	2w	
Torres	S. Tartaglia	P				
...DO	Colonia	P		2x220	3w	
Treinta (30) de Agosto	Carmelo Cervino	P		2x220	3w	
Trenque Lauquen	Cooperativa	C	6,000	220/380	3ph	50
Tres Algarrobos	Cia. de Electricidad	P		2x220	3w	
Unoratu	Jose Vega	P		220	2w	
Urdampilleta	Arturo Cristofol	P		2x220	3w	
Uribelarrea	Jose Tamburini	P		220	2w	
Urquiza	Pitrag Hermanos	P		2x220	3w	
25 de Mayo	Cia. de Luz y Traccion	P		2x220	3w	
Villars	Pedro Garello	P		2x220	3w	
Villa Iris	Gabino Prieto	P				
Villa Sauze	M. Dominici	P		2x220	3w	
Vina	Alberto Zeoli	P		220	2w	
Villa Ansaldi	Inocencio Fernandez	P		2x220	3w	
Villa Ariza		P		2x220	3w	
Villa Lia	Cono Machin	P		2x220	3w	
Villalonga	Vidales Garcia	P		2x220	3w	
Villanueva	Echenique y Garrido	P		2x220	3w	
Villa Rosa	Benjamin Pacheco	P		2x220	3w	
Warnes	Martin J. Itze	P		2x220	3w	
Zapiola	Malaquero y Cia.	P		2x220	3w	
Zavalia	Atilio Garcia	P		2x220	3w	
Province of Catamarca—						
Andalgala	Direccion General de Irrigacion	G		220	1ph	50
Belen	Virgilio Gianchino	P		2x220	3w	
Catamarca	Municipality	M	2,000	220/380	3ph	50
Chumbica	Soc. de Resp. Ltda. Recreo	P		220	2w	
Santa Maria	Pedro Herrero	P		220	2w	
Tinogasta	Isaac Gorkin	P		220	2w	
Territory of Chaco:						
Avia Terai	Jose Salvador	P		2x220	3w	
Gancedo	Pedro Mivad	P		220	2w	
Lapachito	Lazareno Gaceres	P		2x220	3w	
Presidencia Roca	Lisandro Vasquez	P		2x220	3w	
Puerto Bermejo	Pedro Fornoni	P		2x220	3w	
Villa Angela	Mariscotti y Cia.	P		220	2w	

Digitized by Google

TABLE 7a.—*Current Characteristics of Argentine Electric Power Distribution Systems*—Continued

[Other privately owned electric plants and cooperatives—continued]

Location	Proprietor	Ownership [1]	Primary voltage	Secondary voltage	Phase	Cycle
Gobernacion Chubut:						
Comodoro Rivadavia	Ibarguren Hermanos	P		2x220	3w	
Dolavon	Ezio Tacari	P		2x220	3w	
Esquel	Obras Sanitarias de la Nacion	G	2,300	220	3ph	50
Rawson	Municipality	M		220	2w	
Province of Cordoba:						
Achiras	Alberto Meleri	P		2x220	3w	
Adelia Maria	J. U. & E. P. Vila	P		2x220	3w	
Altos de Chipion	Miguel Salvay	P		220	2w	
Arroyito	Ismael Bianchi	P		2x220	3w	
Arroyo Cabral	Juan Moitre	P		220	2w	
Ausonia	Ozaeta y Cia.	P		220	2w	
Avellaneda	Cavallieri Hermanos	P		2x220	3w	
Bengolea	Espiritu Irigo	P		220	2w	
Berrotaeran		P		2x220	3w	
Bialet Masset	Usina Electrica San Roque (San Roque Electric Plant)	P		220/380	3ph	50
Brinckmann	Frigorifico Regional Serrano (Packing plant)	P		2x220	3w	
Bulnes	Carlos Audrito	P		2x220	3w	
Calchin	Gaviglio Hermanos	P		2x220	3w	
Camilo Aldao	Cortassa y Cia.	P		220	2w	
Canals	Cooperative	C		220/380	3ph	50
Canada Luque	Bautista Guglielmone	P		2x220	3w	
Cap. S. A. de Letin	Paladini Hermanos	P		220	2w	
Carnerillo	Carmelo Vitale	P		220	2w	
Carrilobo	Mateo Bella	P		2x220	3w	
Cavanagh	Jorge Fornaso	P		2x220	3w	
Cayuqueo	L. Bernardi	P		2x220	3w	
Chazon	Waldino Fonseca	P		2x220	3w	
Chilibroste	Gabriel Torchio	P		220	2w	
Cintra	Eandi Hermanos	P		220	2w	
Colonia, Caroya	Gardiol y Marucco	P	3,300	220/380	3ph	50
Colonia S. Bartolome	Capello y Pagliano	P		220	2w	
Colonia Vignaud	Ulises Galiano	P		2x220	3w	
Comechingones	Juan Baldomero	P				
Comcepcion del Tio	Municipality	M		2x220	3w	
Corralito	Felix Bertea	P		2x220	3w	
Cruz del Eje	Santiago Fernandez	P		2x220	3w	
Dalmacio Velez	Juan B. Bauzan	P		2x220	3w	
Despenaderos	Fernando E. Prevotel	P		2x220	3w	
El Arando	Vigna Hermanos	P		220	2w	
Elena	Dutto Hermanos	P		2x220	3w	
El Fortin	Teofilo Brugger	P		110	2w	
Espinillo	Marcelo Paz	P		220	2w	
Etruria	Vignetto Hermanos	P		220	2w	
Freyre	F. Bergdolt	P		2x220	3w	
General Deheza	Cavalehino Maino y Cia.	P		220	2w	
General Lavalle	Dutto Hermanos	P		2x220	3w	
General Roca	Usinas Unidas	P		220	2w	
Gigena	Vda. de Baggini	P		220	2w	
Guatimozin	Scaglia Hermanos	P		2x220	3w	
Gutenberg		P		2x220	3w	
Holmberg	Segundo Mazari	P		220	2w	
Huinca Renanco	P. Bergdolt	P		2x220	3w	
Idiazabal	Gallo Cane y Cia.	P		2x220	3w	
Italo	Mario Valencia	P		2x220	3w	
Jaime Peters	Elias Heredio	P		2x220	3w	
Jesus Maria	Leonardo Trettel	P		2x220	3w	
J. Cortes	Jose Echeverria	P		2x220	3w	
J. de la Quintana	Rodolfo Allende	P		2x220	3w	
J. Posse		P		2x220	3w	
Jovita	Junquera y Martin	P		2x220	3w	
La Francia	Fabre y Girogi	P		2x220	3w	
Laguna Larga	Cesar Ambrosio y Hermano	P		2x220	3w	
La Gilda	Emilio Riera	P		2x220	3w	
La Paz	Adolfo Kruti	P		2x220	3w	
La Para	Rodolfo Vaccaro	P		2x220	3w	
La Playesa	Francisco Bocco	P		220	2w	
La Puerta	Gaglia Hermanos	P		2x220	3w	
Las Junturas	Esteban Aimar	P		2x220	3w	
Las Penas	Pedro Capello	P		220	2w	
Las Perdices	Jose Capello	P		2x220	3w	
Las Varas	Campana y Romero	P		2x220	3w	
Lozada	Bautista Vignolo	P		2x220	3w	
Las Higueras	Raul Brutinelli	P		2x220	3w	
Los Cerillos	Jose Rodriguez	P		2x220	3w	
Los Cisnes	Constantino Scodelari	P		2x220	3w	
Los Mistoles	Enrique Rencini	P		2x220	3w	
Luca	Domingo Rocca	P		2x220	3w	
Luque	Usina Electrica de Luque	P		220	2w	
Luxardo	Fabian Troileto	P		2x220	3w	
Mago Gallini	Constantino Scodelari	P		220	2w	
Mar Chiquita		P		2x220	3w	
Marull	Jose Palacios y Cia.	P		2x220	3w	
Matorrales	Higinio Inidori	P		2x220	3w	
Melo	Diego Gomez	P		2x220	3w	
Mina Calvero	Domingo Lorenzatto	P		2x220	3w	
Mira Mar	Max Reutemann	P		220	2w	
Moldes	Pepe Rosario y Cia.	P		2x220	3w	
Monte Buey	Gardebley Hermanos	P		2x220	3w	
Morteros	Jose Aufrane	P		2x220	3w	
Nicolas Bruzzone	Pedro Zulione	P		2x220	3w	
Olmos	Luis Cozzolino	P		2x220	3w	
Oleata	Americo Cessarini	P		220	2w	
Oncativo	Miguel Aimar	P		2x220	3w	
Ordonez	Lorenzi Bravo Grau	P		2x220	3w	
Paso Viejo	Celestino Vazquez	P		2x220	3w	
Pegasano	Bautista Tocelli	P				
Pincen	Sirio Marconi	P		2x220	3w	
Pizzaro	Atilio Unamuno	P		2x220	3w	
Portena	Municipal	M		2x220	3w	
Potro Muerto	Humberto Olivieri	P		2x220	3w	
Pozo del Molle	Mario Mosca	P		2x220	3w	
Pueblo Italiano	Jose Mercandino	P		2x220	3w	
Ranqueles	Felipe Baulleri	P		2x220	3w	
Reduccion	Juan Foggia	P		220	2w	

Digitized by Google

TABLE 7a.—*Current Characteristics of Argentine Electric Power Distribution Systems*—Continued

[Other privately owned electric plants and cooperatives—continued]

Location	Proprietor	Ownership [1]	Primary voltage	Secondary voltage	Phase	Cycle
Province of Cordoba—continued						
Rio Primero	Jose Alcon	P		220	2w	
Rio Tercero	Cooperative	C	10,500	220/380	3ph	50
Sacanta	Boetto y Cia.	P		2x220	3w	
Saira	Arrate M. Silva	P		2x220	3w	
Saldan	Pascual Giliberti	P		2x220	3w	
Sampacho	Passoli Bros.	P		2x220	3w	
Sanabria	Juan Crivallo	P		2x220	3w	
San Bartolome	Copello y Pogliano	P		220	2w	
Santa Eufemia	Pedro Casaux	P		220	2w	
San Jose de la Dormida	Leopoldo Caro	P		220	1ph	50
San Marcos	Jose Pagnone	P		2x220	3w	
Santa Ros a de Lima	Blas E. Baroneto y Cia.	P		220	2w	
Santa Victoria		P				
Santiago Temple	Carlos Destefanis	P		2x220	3w	
Seeber	Calatroni Bros.	P		2x220	3w	
Sereo	Juan Amoedo	P		2x220	3w	
Serrano	Vergare Bros.	P		2x220	3w	
Ticino	Lorenzeti Bros	P		220	2w	
Tio Pujio	Jose Comini	P		220	2w	
Tosquitas	Natalio Gasparole	P		2x220	3w	
Transito	Virgilio Bianchi	P		2x220	3w	
Villa Ascasubi	Luis Gallo	P		2x220	3w	
Villa del Lago	San Roque Electric Plant	C		220/380	3ph	50
Villa General Mitre	Manuel L. Carbone	P		2x220	3w	
Villa Valeria	Iriarte Bros.	P		220	3w	
Province of Corrientes:						
Colodrero	F. Alvarez	P		220	2w	
Concepcion	Municipality	M		2x220	3w	
Empedrado	Gersbach y Cia.	P		2x220	3w	
Esquina	Cocoz, Caballini y Cia	P		2x220	3w	
General Paz	G. Kopervaser	P		2x220	3w	
Gobernador Racedo	Federico Schuster	P		220	2w	
Goya	Municipality	M		2x220	3w	
Guaviri	Manuel Gaonzalez	P		2x220	3w	
Lomas de Vellejo	Ramon Herrera	P		2x220	3w	
Mburucuya		P		2x220	3w	
Montecaseros	Balbi Bros.	P	2,300	220/380	3ph	50
Saladas	Jose Cervera	P		2x220	3w	
Saladas	Cia. de Electricidad S. A.	P		2x220	3w	
Santo Tome	Usina Electrica de Santo Tome	P		2x220	3w	
S. Luis del Palmar	G. Kopenvaser	P		220	2w	
Sauce		P		2x220	3w	
Province Entre Rios:						
Alcaraz	Mastaglia y Gonzalez	P		220	2w	
Antelo	Marcos Perez	P		220	2w	
Aranguren	Federico Rgaff	P		220	2w	
Bovril	Maximo Grubb	P		2x220	3w	
Concepcion del Uruguay	Obras Sanitarias de la Nacion	G	2,200	220	3ph	50
Dominguez	A. Charchi	P		2x220	3w	
Fabrica Colon	Ernesto Kowalsky	P		2x110	3w	
Federacion	Fernando Mazurier	P		2x220	3w	
Galarza	Juan Simer	P		220	2w	
General Campos	Felix Ben	P		220	2w	
Gilbert	Graff Bros.	P		220	2w	
Hernandarias	Cattini Suarez & Co.	P		220	2w	
Hernandez	F. Deppen	P		220	2w	
Holt	Vispo y Westermeier	P		2x220	3w	
La Calandria	A. Miguel	P				
Liberos	S. Surajonob	P		2x220	3w	
Lucas Gonzalez	Zof Bros.	P		2x220	3w	
Macia	Luis Ibarra	P		2x220	3w	
Mansilla	Monti y Olaso	P		2x220	3w	
Maria Grande	Marco Bros.	P		220	2w	
Minones	A. Vannucci	P		2x220	3w	
Nogoya	Cia. Luz y Fuerza de Nogoya	P		2x220	3w	
Pedermar	Juan Migliora	P		220	2w	
Primero de Mayo	Juan Bertolotti	P		220	2w	
Pueblo Brugo	Luis Mayer	P		220	2w	
San Jose de Feliciano	Alfonso Fernando	P		2x220	3w	
Santa Elena	Estab. Bovril Ltda.	P		220	2w	
San Julian	Atilio Asensio	P				
Segui	Felix Cucio	P		2x220	3w	
Sola	Carlos Grassi	P		2x220	3w	
Stroebel	Juan Nobile	P				
Ubajay	Gulghini y Pancracio	P		220	2w	
Urdinnarain	Kregmborg A.	P		220	2w	
Urquiza	Francisco Elbert	P		220	2w	
Valle Maria		P		110	2w	
Victoria	C. E. de Victoria	P		2x220	3w	
..Do	Primitiva Luz Electrica de Victoria	P		2x220	3w	
Villa Clara	Goldstein Estate	P		2x220	3w	
Villa Elisa	Enrique Molfiolg	P		220	2w	
Villa Federal	Empresa de Luz y Fuerza de Villa Federal	P		2x220	3w	
Villa G. Ramirez	Silvino Cluto	P		220	2w	
Villa Larroque	Victoriano de Miguel	P		220	2w	
Villa Mantero	Isidoro Blason	P		220	2w	
Villa San Jose	Bard Bros.	P		2x220	3w	
Villa del Rosario	J. Scaglia	P		220	2w	
Territory of Formosa:						
Palo Santo	Mario Orguin	P		2x220	3w	
Pozo del Tigre	Miguel Fernandez	P		220	2w	
Province Jujuy:						
El Carmen	Romulado Laplaza	P		220	2w	
Ledesma	.....do	P		220	2w	
Perico	.....do	P		220	2w	
Perico del Carmen	.....do	P		220	2w	
San Francisco Pumahuasi	Cia. Minera Metal, S.A.	P		2x235	3w	
San Pedro	Empresa de Luz y Fuerza de San Pedro	P		2x220	3w	
Tilcara	Obras Sanitarias de la Nacion	G				

Digitized by Google

TABLE 7a.—*Current Characteristics of Argentine Electric Power Distribution Systems*—Continued

[Other privately owned electric plants and cooperatives—continued]

Location	Proprietor	Ownership [1]	Primary voltage	Secondary voltage	Phase	Cycle
Territory of La Pampa:						
Apacuyo	Dario Sastre	P		2x220	3w	.....
Aguas Duenas	Tomas Grosso	P		2x220	3w	.....
Alpachiri	S.A. Comercio e Industrias	P		2x220	3w	.....
Alta Italia	Cristofol y Cia.	P		2x220	3w	.....
Anguil	Enrique Schneiber	P		220	2w	.....
Arata	Federico Grova	P		220	2w	.....
A. Van Praet	Guido Simonini	P		220	2w	.....
Bernasconi	Chillon Ibeas y Cia.	P		2x220	3w	.....
Calefu	T. Blanc	P		2x235	3w	.....
Candelaria	Municipality	M		2x220	3w	.....
Castex	S. A. Comercio e Industrias	P		2x220	3w	.....
Catrilo	Piombi y Vignocchi	P		2x220	3w	.....
Cereales	Pedro Gernendez	P		2x220	3w	.....
Cevallos	Jose Eugenio	P		2x220	3w	.....
Colonia Baron	Esteban Giordano	P		2x220	3w	.....
Espeluzzi	Negrini Bros.	P		2x220	3w	.....
Gaviotas	Jose Carrizo	P		2x220	3w	.....
General Acha	Empresa Electrica de Bahia Blance	P		2x220	3w	.....
Guatrache	S. A. Comercio e Industria	P		2x220	3w	.....
Hipolito Irigoyen	Sebastian Elvira	P		2x220	3w	.....
Ingeniero Luigi	Cristofol y Borda	P		2x220	3w	.....
Intendente Alvear	La Electro Ind. S. A.	P		2x220	3w	.....
Jacinto Arauz	Vitalini y Cia.	P		2x220	3w	.....
La Picasa	Juan Buhiaro	P		2x220	3w	.....
Larroude		P		2x220	3w	.....
Longuimay	Gentil Calderon de Garcia	P		220	2w	.....
Luan Toro	Jose Alvarez	P		2x220	3w	.....
Macachin	Eduardo Casenave	P		2x220	3w	.....
Maisonnave	Genesio Matta	P		2x220	3w	.....
Miguel Cane	Gregorio Audisio	P		2x220	3w	.....
Miguel Riglos	Francisco Eloiza	P		2x220	3w	.....
Monte Nievas	Candida Martin de Goyena	P		220	2w	.....
Ojeda	Juan Favella	P		2x220	3w	.....
Parera	A. Cristofal	P		2x220	3w	.....
Pichi Mahuida	Silvio Zappa	P		220	2w	.....
Quehue	Francisco Belloti	P		2x220	3w	.....
Quemi Quemi	Empresa Electrica La Pampeana	P		2x220	3w	.....
Quetrequen	Arturo Cristofol	P		2x220	3w	.....
Realico	Martin Gandini y Cia.	P		2x220	3w	.....
Remeco	A. Grupanger	P		2x220	3w	.....
Santa Anna	Municipality	M		2x220	3w	.....
T. M. Anchorena	Arceniaga y Cia.	P		2x220	3w	.....
Trenel	Hector Giorgeto	P		2x220	3w	.....
Uribubu	Felico y Nicolini	P		2x220	3w	.....
Veritz	Francisco Velanco	P		220	2w	.....
Victoria	Appap y Fuentes	P		2x220	3w	.....
Villa Aba	Juan Reiser	P		220	2w	.....
Villa Jarden	Pivotto y Cia.	P		2x220	3w	.....
Winifreda	Pedro Pressello	P		2x220	3w	.....
Yerba Buena	Benjamin Zacheo	P		2x220	3w	.....
Province La Rioja:						
La Rioja	Obras Sanitarias de la Nacion	G	2,300	220	2ph	50
..Do	Cia. Americana de Luz y Fuerza	P				
Cebollar	Alberto Silva	P		2x220	3w	.....
Chilecito	Crossley Bros.	P		2x220	3w	.....
Martano	Antonio Gaido	P		2x235	3w	.....
Milagro	Juan Iamberti	P		2x235	3w	.....
Nonogasta	Davila Larguia	P		220/380	3ph	50
Province Mendoza:						
Bowen	Manuel Asen	P		220	2w	.....
Colonia Alvear	Tomas J. Fleming	P		2x220	3w	.....
General Alvear	.....do	P		2x220	3w	.....
Junin	Manuel Banos	P		220	2w	.....
Malargue	Eugenio Isazaky	P		3x220	3ph	50
Medrano	Remberto Richard	P		220	2w	.....
Monte Coman	Enrique Marinangeli	P		2x220	3w	.....
Palmira	Vda. de Redital y Cia.	P		220	2w	.....
Rivadavia	Ronchetti y Calietti	P		2x220	3w	.....
Tupungato	Pedro Dalforo	P		2x220	3w	.....
Villa Atuel	.....do	P		220/380	3ph	50
Canalejas	Pedro Beltrame	P		220	2w	.....
Corral de Lorca	Jose Alvarez	P		220	2w	.....
Guedales	Atilio Bard	P		2x220	3w	.....
Las Acequias	Sebastian L. Diaz	P		2x220	3w	.....
Las Huagras		P		2x220	3w	.....
Territory of Misiones:						
Apostoles	Schuchardt y Cia.	P		2x220	3w	.....
Bompland	Ricardo Rendon	P		220	2w	.....
Conception de la Sierra	Municipality	M		220	2w	.....
Posadas	Municipality	M		2x220	3w	.....
Territory of Neuquen (Gobernacion):						
Junin de los Andes	Francisco Joffre	P		2x220	3w	.....
				2x220	3w	.....
Neuquen (Gob.)	Usinas Unidas	C	2,300	220/380	3ph	50
San Martin de los Andes	Gabriel Saurel	P		220	2w	.....
Zapala	Guitini y Sasso	P		2x220	3w	.....
Territory Rio Negro:						
Bariloche	Cia. Servicios Publicos Bariloche	P	6,600	220/380	3ph	50
General Conesa	Anselmo Garcia	P		2x220	3w	.....
General Roja	Usinas Unidas	C		220x2	3w	.....
Jacobacci	San Martin y Cia.	P		2x220	3w	.....
Lamarque	Agustin Sanchez Garcia	P		2x220	3w	.....
Maquinchao	San Martin y Cia.	P		2x220	3w	.....
Rio Colorado	Joffre e Ibeas Hnos.	P		2x220	3w	.....
San Antonio Oeste	J. Izco y Cia.	P		2x220	3w	.....
Villa Regina	Usinas Unidas	C	2,30	220x380	3ph	50
				2x220	3w	.....
Province Salta:						
Aguaray	Evaristo Blasco	P		220	2w	.....
Capayate	Lavaque Hnos.	P		220	2w	.....

Digitized by Google

TABLE 7a.—*Current Characteristics of Argentine Electric Power Distribution Systems*—Continued

[Other privately owned electric plants and cooperatives—continued]

Location	Proprietor	Ownership [1]	Primary voltage	Secondary voltage	Phase	Cycle
Province Salta—Continued						
Ceibalito	Manuel Vardo	P		220	2w	.....
Chicoana	Llaneras y Cia	P		220	2w	.....
Coronel Olleros	Julian Parada	P		2x220	2w	.....
Coronel Moldes	Julian Las Heras	P		220	2w	.....
Elordi	Humberto Cardman	P		2x220	3w	.....
Embaracacion	Aniceto Gusils	P		220	2w	.....
Esteco	Juan Taso	P		230	2w	.....
Guemes	Leonarduzzi y Cias	P		2x220	3w	.....
Metan	Cooperativa de Metan	C		2x220	3w	.....
Do	Lavaque Poma y Cia	P		2x220	3w	.....
Pichanal	Manuel Flores	P		220	2w	.....
Rosario Frontera	Quirico de la Orden	P		2x220	3w	.....
Ruiz de los Llanos	Domenichelli e Indi	P		220	2w	.....
Talapampa	Antonio Molde	P		2x220	3w	.....
Tartagal	Roque Brozicevich	P		220	2w	.....
Vespucio	Miguel Calicho	P		2x220	3w	.....
Province San Juan:						
Cochaual	F. Arranz	P		2x230	3w	.....
Jachal	Puiggros, Gandera y Fonseca	P		2x220	3w	.....
Morayes	A. Fuentes	P		230	2w	.....
Retamito	Alberto Fisher	P		2x220	3w	.....
Villa Colon	Antonio Sanchez	P		2x220	3w	.....
Province San Luis:						
Buena Esperanza	Casanova y Steger	P		220	2w	.....
Choames	Severo Gomez	P		2x220	3w	.....
Concaran	M. Markart	P		2x220	3w	.....
Naschel	Juan C. Rosso	P		220	2w	.....
Pisco Yacu	Joaquin Cremades	P		2x220	3w	.....
Quines	Jose Galvan	P		2x220	3w	.....
San Francisco	Jose Blanche y Carletti	P		2x220	3w	.....
Tilisarao	Francisco Emma	P		220	2w	.....
Villa Dolores	R. Arias Orueta	P		2x220	3w	.....
Zanjitas	Jose Urbino	P		2x220	3w	.....
Territory Santa Cruz:						
Colonia General Las Heras	Silvio Fernandez	P		2x220	3w	.....
Puerto Deseado	Coccoz Hnos.	P		2x220	3w	.....
Rio Gallegos	Cia. Electrica de Rio Gallegos	C		2x220	3w	.....
San Julian	Carlos Pape	P		2x220	3w	.....
Santa Cruz	S. A. Elec. de Santa Cruz	C		2x220	3w	.....
Province Santa Fe:						
Acebal	Estevan Trajanovich	P		2x220	3w	.....
Alejandra	Juan V. Vogt	P		2x220	3w	.....
Alvear	Atilio Cionchi	P		2x220	3w	.....
Arocena	Juan Ortiz	P		220	2w	.....
Arminda	Pascual Serra	P		2x220	3w	.....
Arroyo Seco	Cia. Gral A. de Luz y Fuerza	C		2x220	3w	.....
Arrufo	Miguel Ronco	P		2x220	3w	.....
Ataliva	Enrique Crippa	P		220	2w	.....
Barrancos	De Boe y Camarasa	P		2x220	3w	.....
Benard	Klein y Bloek	P		220	2w	.....
Bereberu	.....	C		2x220	3w	.....
Bigand	Julio P. Oppici	P		2x220	3w	.....
Bombal	Manuel Rebora	P		2x220	3w	.....
Boquet	Gabriel Torehio	P		2x220	3w	.....
Bustinza	Rivolta y Rey	P		2x220	3w	.....
Cabal	.....	P		2x220	3w	.....
Calchaqui	Jose Rosetani	P		2x220	3w	.....
California	Antonio Rezza	P		2x220	3w	.....
Canada de Ucle	Aristides Cabrini	P		220	2w	.....
Canada de Rosquin	Natalio Baccheta	P		2x220	3w	.....
Canas	Pedro Razano	P		2x220	3w	.....
Carlos Pellegrini	Victorio Gaido y M. Cravero	P		2x220	3w	.....
Carmen	Jose Walmer	P		2x220	3w	.....
Carmen del Sauce	A. P. Leguizamon	P		220	2w	.....
Carreras	Zabaleta Hnos.	P		2x220	3w	.....
Casalengno	.....do	P		2x220	3w	.....
Casablanca	Boggiato y Festa	P		2x220	3w	.....
Casas	Giordana y Ron	P		220	2w	.....
Casilda	Obras Sanitarias de la Nacion	G	2,200	220/380	3ph	50
Centeno	Brilio del Lago	P		220	2w	.....
Ceres	R. Coppo y Cia	P		2x220	3w	.....
Chabas	Ignacio Garinaldi	P		2x220	3w	.....
Chovet	Jose Walmer	P		2x220	3w	.....
Clusellas	Jose Martinetti	P		2x220	3w	.....
Colonia Belgrano	Reinaldo Cleri	P		220	2w	.....
Colonia Margarita	Jose y Sngel Monohamp	P		2x220	3w	.....
Colonia Santa Clara	.....	P		220	2w	.....
Cora	Metan Hnos. y Cia.	P		220/380	3ph	50
Coronel Bogado	Urbina Ghianacobe	P		220	2w	.....
Crespo	Jose Zilli	P		2x220	3w	.....
Diego de Alvear	Bertolino y Rey	P		2x220	3w	.....
Elisa	Francisco Cambursano	P		2x220	3w	.....
Elortondo	Jose Walmer	P		2x220	3w	.....
Escalada	J. P. Bocardo	P		2x220	3w	.....
Esmerlada	Vda. de Forzani	P		2x220	3w	.....
Esperanza	Municipality	M		2x220	3w	.....
Estacion Margarita	Carlos Mai	P		2x220	3w	.....
Felicia	Bruno Wilde	P		220	2w	.....
Florencia	Sociedad Algodonera de Florencia	P		220	2w	.....
Frank	Domingo Brusa	P		220	2w	.....
Fuentes	German P. Lange	P		2x220	3w	.....
Gessle	Juan Carlos Camussi	P		220	2w	.....
Helve	Sara A. de Vannucci	P		2x220	3w	.....
Hellia	A. Di Benedetto y E. Piccaluga	P		2x220	3w	.....
Humboldt	M. A. Reutemann Bros	P		220	2w	.....
Hununcaras	P. Alesandro	P		.....	.....	.....
Hunqueras	A. Wesmisther	P		220	2w	.....
J. B. Molina	Manuel Rebora	P		2x220	3w	.....
La Cabral	Juan Nasifo	P		2x220	3w	.....
La Criolla	Folco y. Gloria	P		220	2w	.....
Landetta	Mateo Ellena	P		2x220	3w	.....

Digitized by Google

TABLE 7a.—*Current Characteristics of Argentine Electric Power Distribution Systems*—Continued

[Other privately owned electric plants and cooperatives—continued]

Location	Proprietor	Ownership [1]	Primary voltage	Secondary voltage	Phase	Cycle
Province Santa Fe—continued						
La Pelada	Francisco Abba	P		220	2w	
Larrechea	Cocciorelli	P		220	2w	
Las Palmeras	H. Grad	P		220	2w	
Las Petacas	Alejandro Pescetti	P		2x220	3w	
Las Tecas	Federico Peiler	P		2x225	3w	
Las Trojas	Jose Tapia	P		220	2w	
Lazzari	Luis C. Cocoz	P		2x220	3w	
Lehman	Carloa Maragnani	P		220	2w	
Llambi Campo	Borgonov y Demarchi	P		2x220	3w	
Los Cardos	Francisco Malta	P		220	2w	
Los Molinos	Leonelo Tabora	P		220	2w	
Los Sembrados	Sarove Volpe y Cia.	P		2x220	3w	
Maggiola	Bellini Hnos. y Cia.	P		2x220	3w	
Mal Abrigo	Alfonso Bock	P		2x220	3w	
Margarita	Jose Cellerino	P		220	2w	
Maria Juana	Dalmasso Hnos.	P		2x220	3w	
Maria Susana	Jose Brussino	P		2x220	3w	
Maria Teresa	Ferrer y Giordano	P		2x220	3w	
Matilde	Guillermo Gunziguer	P		220	2w	
Monigotes	Luis Pessana	P		220	2w	
Monje	Simon Rosa	P		2x220	3w	
Montes de Cca	Diomedia Corneli	P		2x220	3w	
Muqueta	Estate E. Svilarich	P		2x220	3w	
Nelson	Luis Peressutti	P		220	2w	
Nueva Roma	Baglione y Culasso	P		2x220	3w	
Oliveros	Angelina A. de Ortiz	P		220	2w	
Palacios	Padro Huber	P		2x220	3w	
Pavon Arriba	Antonio Ariani	P		220	2w	
Piamonte	Elias Quiano	P		220	2w	
Portelas	A. Boero	P		2x220	3w	
Progreso	Gustavo Bucholz	P		2x220	3w	
Providencia	Carlos Schmittendorf	P		220	2w	
Pueblo Godeken	Juan Apiolaza	P		220	2w	
Pueblo Munoz	Klein y Block	P		2x220	3w	
Pujato	Colegio Adventista	P		220	2w	
Rafaela	S. A. de Electricidad	C	3,300	220/380	3ph	50
Ramayon	Juan Zilli	P		220	2w	
Ramona	Bernardino Barbero	P		220	2w	
Recreo	Fco. J. Sadoni	P		2x220	3w	
Rigby	Jose Marchionnatti	P		220	2w	
Romang	Christian A. Ramseyer	P		220	2w	
Rosario	S. D. de Rosario	P	6,000	220/380	3ph	50
				2x220	3w	
Rosetti	Martinelli Hnos.	P		2x220	3w	
Saa Peroyra	Bertero y Giordana	P		220	2w	
Saneti Spiritu		P		2x220	3w	
San Eduardo	Abello Hnos.	P		2x220	3w	
San Estanislao	Juan Martini	P		2x220	3w	
San Fabian	Juan Ortiz	P		2x220	3w	
Sanford	Carlos Steiner	P		220	2w	
San Gregorio	Juan de Lellis	P		220	2w	
San Guillermo	Francisco Storero	P		2x220	3w	
San Javier	Domingo N. Cordiviola	P		2x220	3w	
San Martin de las Escobas	Jose Dei-Cas	P		220	2w	
San Martin Norte	Antonio Storero	P		2x220	3w	
Santa Clara de Buena Vista	Martini Hnos.	P		220	2w	
Santa Clara de Squier	S. A. Ind. y Com. Marconetti	P		2x220	3w	
Santa Fe	Municipal	M		2x220	3w	
Santa Teresa	Codo Hnos.	P		2x220	3w	
Santo Domingo	Jose Zimmermann	P		2x220	3w	
Santo Tome	Juan B. Nigro	P		220/380	3ph	50
Sarmiento	Juan Zimmermann	P		220	2w	
Soledad	Crispiniano Perez	P		2x220	3w	
Soldini	Klein y Block	P		220	2w	
Suardi	Luis F. Roggero	P		2x220	3w	
Susana	Eugenio Mola	P		2x220	3w	
Tacural	Galegari Enrique	P		220	2w	
Tarragona	Carlos Rosetti	P		2x220	3w	
Theobold	Pablo Lagostime & Sons	P		2x220	3w	
Tobal	G. Salvidia	P		2x220	3w	
Tortugas	Boni y Canavesio	P		220	2w	
Uranga	A. Baccari	P		2x220	3w	
Verdo Tuerto	Cooperativa	C	3,000	220/380	3ph	50
Videla	Alberto Fischer	P		220	2w	
Villa Amelia	Urquiza y Rufinatti	P		220	2w	
Villa Ana	La Forestal Argentina	P		2x220	3w	
Villa Caffarata	Priotti y Cornari	P		2x220	3w	
Villa Eloisa	Rosas y Carasatorres	P		220	2w	
Villa Juncal	Pedro Cabrini	P		2x220	3w	
Villa Ocampo	Cia. Industrial Norte de Sta. Fe	P		2x220	3w	
Villa Trinidad	Bautista Oddone	P		2x220	3w	
Virginia	U. Businelli	P		2x220	3w	
Wheelright	Gallo y Cane	P		2x220	3w	
Zavalla	Juan Silva	P		2/220	3w	
Zenon Pereyra	Ernesto Forzani	P		2x220	3w	
Province Santiago del Estero:						
Bandera	Cia. Volinera Argentina	P	400	220/380	3ph	50
Beltran	Dante Pisetta	P		2x220	3w	
Cejalao		P				
Clodomira	Manuel Munoz	P		2x220	3w	
Colonia Dora	Skira Bros.	P		220	2w	
Estacion Fernandez	Simon Sosa y Cia.	P		2x220	3w	
Garza	Victoriano Gomez	P		2x220	3w	
General Mitre	Buffa y Gengolani	P		2x220	3w	
Icano	Jose & Banjemain Bercoff	P		220	2w	
La Prida	E. Hernandez	P		2x220	3w	
La Punta	P. Guido	P		2x220	3w	
LaValle	Antonio Carles	P		2x220	3w	
Loreto	Haraldo Wesberg	P		2x220	3w	
Los Telares	Carlos Bonfanti	P		2x220	3w	
Malbran	Alehandro Palmieri	P		2x220	3w	
N. Miraval	Antonio Riglos	P		2x220	3w	
Ojo del Agua	Leopoldo Carriso	P		2x220	3w	
Pinto	Dante G. Buffa	P		2x220	3w	

Digitized by Google

TABLE 7a.—*Current Characteristics of Argentine Electric Power Distribution Systems*—Continued

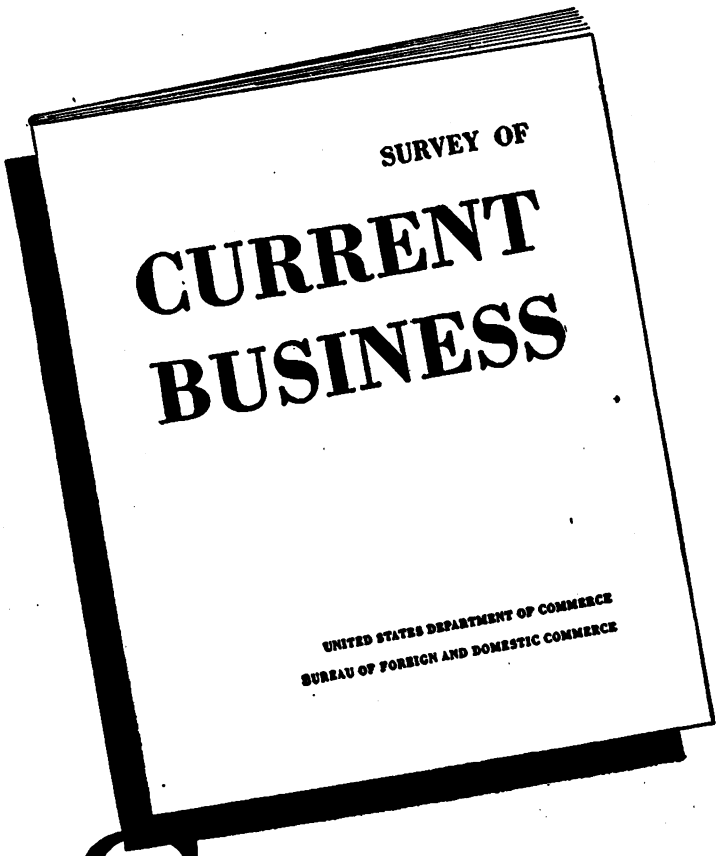
[Other privately owned electric plants and cooperatives—continued]

Location	Proprietor	Ownership [1]	Primary voltage	Secondary voltage	Phase	Cycle
Province Santiago del Estero—continued						
Quimili	Pedro Gelid	P		2x220	3w	.....
Roversi	Alfredo Egen	P		2x220	3w	.....
San Ramon	Atilio Fourcade	P		2x220	3w	.....
Santiago del Estero	Obras Sanitarias de la Nacion	G	2,300	220	3ph	50
Selva	Juan Versalles	P		2x220	3w	.....
Suncho Corral	Carlos Beltrame	P		2x220	3w	.....
Tintina	Hipolito Soria	P		220	2w	.....
Province Tucuman:						
Acheral	Vicente Campeny	P		220	2w	.....
Alderetes	Colonbres Garmedia	P		2x220	3w	.....
Aquirales	Vicente A. Villada	P		220	2w	.....
Banda de Rio Sali	Benjamin Araoz	P		2x220	3w	.....
Bella Vista	Enrique Marcoux	P		2x220	3w	.....
Colombres	Francisco Beosillan	P		2x220	3w	.....
Choromoro	Antonio Medina	P		2x220	3w	.....
Famailla	Mario A. Gianserra	P		2x220	2w	.....
Graneros	Mobile y Bertolli	P		220	2w	.....
Guzman	Leon Macias	P		2x220	3w	.....
La Cocha	Schadlich	P		220	3w	.....
Las Cejas	Moises Ayala	P		220	2w	.....
Leocadio Paz	Rafael Paz	P		2x220	3w	.....
Los Ralos	Elias Richa	P		2x220	3w	.....
Marino		P		2x220	3w	.....
Medinas	Fernando Lopez	P		2x220	3w	.....
Monteros	Ottonello y Cias.	P		2x220	3w	.....
Rio Colorado	Dante Gianserra	P		220	2w	.....
Rio Seco	Angel R. Floether	P		220/380	3ph	50
San Pedro de Colelao		P		220	2w	.....
Siete de Abril	Emilio Plaza	P		220	2w	.....
Simoca	Francisco Curin	P		2x220	3w	.....
Tafi del Valle	Jose Silva Frias	P		2x220	3w	.....
Trancas	Lamberto Ungherini	P		220	2w	.....
Villa Alberdi	Christian Kempf	P		2x220	3w	.....
Villa Quinteros	Fructuoso Lescano	P		2x220	3w	.....

P. Private. M. Municipal. C. Cooperatively owned. G. National Government.

☆U. S. GOVERNMENT PRINTING OFFICE: 1946—707798—128

Digitized by Google



$2.00
per year

SURVEY OF CURRENT BUSINESS

THIS AUTHORITATIVE MONTHLY PERIODICAL makes easily available to businessmen over 2,200 comprehensive facts about production, stocks, orders, prices, sales, shipments, etc., of the industries of the United States by means of text, tables, charts, and index numbers.

A sample copy will be sent, on request to the
Bureau of Foreign and Domestic Commerce,
Washington, D. C.

$2.00 per year, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Digitized by Google

A New Service

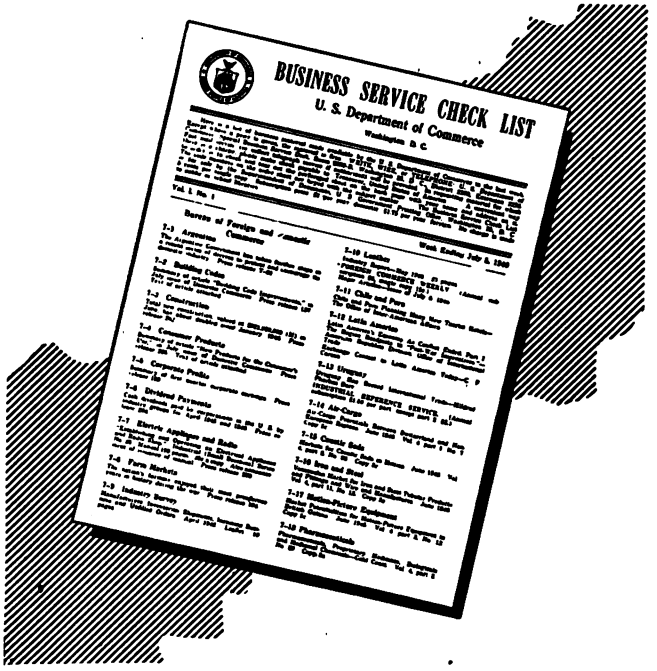
by the U. S. DEPARTMENT OF COMMERCE

BUSINESS SERVICE CHECK LIST

The U. S. Department of Commerce itemizes all news releases, publications, speeches, pamphlets, and books published the previous week in its weekly Business Service Check List. This listing will enable you to order the material that will be of specific aid to you in your business.

Typical of the listed material that will interest you are marketing data, articles on specific industries and business, foreign markets, establishing and operating numerous kinds of small businesses, and foreign industrial wartime secrets.

Many of the items in the BUSINESS SERVICE CHECK LIST are free.



The listing covers these Bureaus and Offices:

Census Bureau
Civil Aeronautics Administration
Coast and Geodetic Survey
Foreign Trade Zones Board
National Bureau of Standards
Office of Business Economics
Office of Domestic Commerce
Office of International Trade
Office of Small Business
Office of Technical Services
Patent Office
Weather Bureau

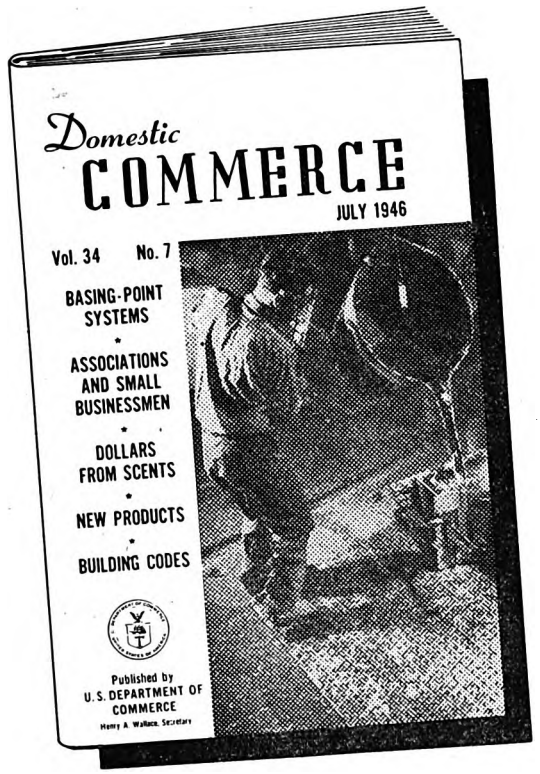
Annual subscription **$1** *A sample copy will be sent on request.*

Order today from the

Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

Digitized by Google

Every Businessman Could Profit by Reading . . .



Pocket Size

DOMESTIC COMMERCE

96 Pages of Facts and Ideas!

- Timely news on problems that face businessmen today.
- Marketing information on numerous business activities.
- Economic surveys and trends.
- New products being designed for consumer use.
- Progress and changing conditions of industry and business.
- Monthly listing of all business service material published by the U. S. Department of Commerce.
- What's New—a regular feature on patents dedicated for public use, and new and abandoned patents.

These are typical of the material currently appearing. Articles written by specialists in the U. S. Department of Commerce as well as those of other governmental agencies.

Annual Subscription $1

Order today from the

Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

(Make check payable to Treasurer, U. S. A.)

Digitized by Google

U.S. Foreign and Domestic Commerce Bureau

Industrial Reference Service

U. S. DEPARTMENT OF COMMERCE, W. AVERELL HARRIMAN, *Secretary*
Office of International Trade, ARTHUR PAUL, *Director*

Part 1. TRANSPORTATION and PUBLIC UTILITIES

Available in Parts Covering Selected Services and Commodities
Annual Subscription $1.50. Price this report 5 cents
For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., or any of the Department's Field Offices

Volume 4—Part 1 | November 1946 | Number 28

Electric Power in Northeastern Brazil

By Guida Berrigan Hall, Transportation and Communications Division,
Special Services and Intelligence Branch

Based on United States Foreign Service Reports, Official Brazilian Documents, and other sources

Brazil has a vast hydraulic potential in its abundant rivers and high waterfalls, but of its estimated 20,000,000 horsepower, not more than 3.5 percent is now utilized.

Along with Brazil's growing economic development is the demand for electric energy. Present installations are no longer adequate for the actual needs of the country. The expansion of old plants and the construction of new generating stations are necessary to meet this demand for an increased power supply. Some of the projects in this connection are already being developed, while others are still in the process of study and survey.

In the former group is the development of Paulo Afonso Falls on the Sao Francisco River. When completed, this project will add approximately 500,000 horsepower (which may be developed to the extent of from 100,000 to 200,000 kilowatts) to the electric energy supply of northeastern Brazil, and will include the States of Ceari, Rio Grande do Norte, Paraiba, Pernambuco, Alagoas, Sergipe, and Bahia.

Brazilian Rivers and Waterfalls

The richest hydroelectric potential of Brazil is in the Parana River Basin, which has about 9,720,900 horsepower. The Amazon Basin is credited with having more than 4,000,000 horsepower. The potential hydraulic energy of the various river basins of Brazil and their percentage of the country's total potential are shown in table 1.

The States with the largest hydraulic potentialities are the following: Minas Gerais (5,828,000 horsepower), Sao Paulo (2,602,000 horsepower), Parana (2,590,000 horsepower), Mato Grosso (2,202,000 horsepower), and Para (1,875,000 horsepower).

Numerous waterfalls are found along the Brazilian rivers. The State of Sao Paulo alone has more than 100 waterfalls, each with a capacity of more than 10.000 horsepower. Other important falls are the 12 at the headwaters of the Amazon, 6 on the Sao Francisco River, 19 on the Rio de Prata, and 19 at the watershed emptying into the ocean. Smaller falls, averaging 1,000 horsepower each, are scattered throughout the country.

TABLE 1.—*Hydroelectric Potential of Brazilian River Basins and Percentage of Total*

[In horsepower]

River basin	Potential horsepower	Percentage of country's total
Parana	9,720,900	49.8
Amazon	4,395,900	22.5
Eastern	2,693,500	13.8
Sao Francisco	1,573,300	8.1
Southeastern	758,700	3.9
Uruguay	198,900	1.0
Paraguay	89,500	0.5
Northeastern	88,400	0.4
Total	19,519,100	100.0

The five largest and most important waterfalls in Brazil from the standpoint of hydroelectric potential may be outlined briefly as follows:

Salto do Guaira or Sete Quedas, on the Parana River, in the State of Parana, has an estimated horsepower of 1,500,000.

Cachoeira de Paulo Afonso on the Sao Francisco River, which forms the boundary line between the States of Alagoas and Bahia, has an estimated 560,000 horsepower.

Saltos do Iguassu, or Santa Maria, with an estimated 340,000 horsepower, is on the Parana River on the boundary of Brazil and Argentina.

Salto Urubu-Punga is also on the Parana River, and on the boundary line of the States of Sao Paulo and Mato Grosso. It has a potential of 250,000 horsepower.

Cachoeira do Marimbondo, on the Rio Grande, on the boundary between the States of Minas Gerais and Sao Paulo, has an estimated potential of 150,000 horsepower.

Need for Additional Electrical Energy

Northeastern Brazil at present is dependent upon the Southern States (1,800 to 4,200 miles distant) for various foodstuffs and manufactured products. The proposed development of the Sao Francisco Valley and its colonization will relieve this dependency to a great extent and eliminate the high transportation costs now involved in bringing in these supplies.

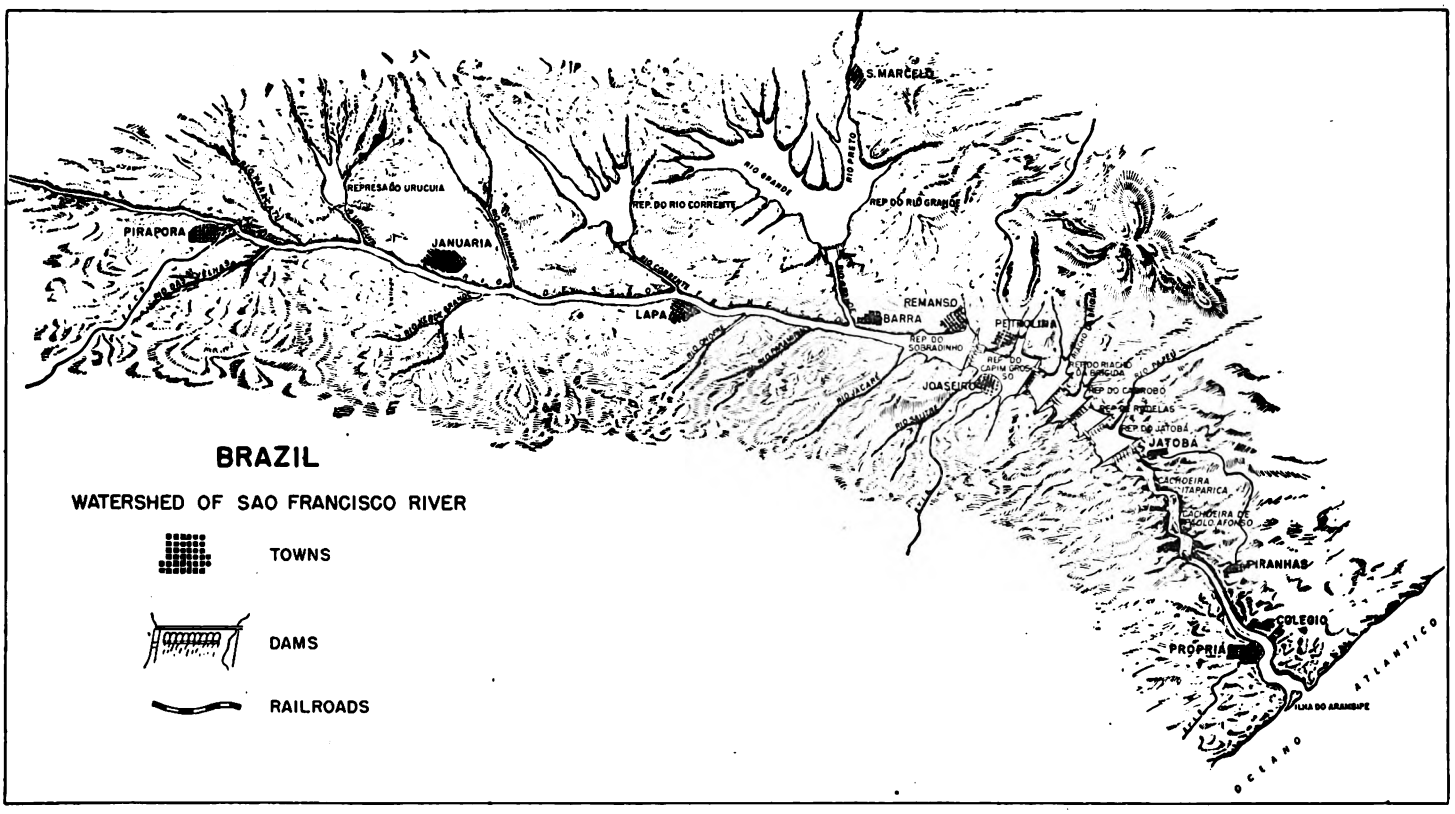
In line with this development, the Brazilian Government has for some time been interested in the utilization of Paulo Afonso Falls for the generation of the required electricity.

One of the initial steps taken by the Government in extending the power facilities of northeastern Brazil was the creation of the Companhia Hidro do Sao Francisco by Decree Law No. 8031, as mentioned in the October 9, 1945, issue of Diario Oficial. This company has a capital stock of 400,000,000 cruzeiros (approximately $20,000,000), which is to be used for the development of the Paulo Afonso Falls hydroelectric project. Fifty-one percent of this sum is to be subscribed by the Brazilian Government; the remainder of the stock is available for private purchase.

The company has immunity for 10 years from duties, taxes, and other fees to which materials and equipment might be subject upon importation. Waiver is also made of all Federal, State, and municipal taxes for the same period. The head offices of the company are located in Rio de Janeiro. Its duration extends for 50 years, but the right to terminate it before that time is reserved by the General Assembly.

N.Y.U. UNIVERSITY DEC 30 1946 LIBRARY

Digitized by Google



The Falls of Paulo Afonso

The Sao Francisco River is located in the States of Alagoas and Pernambuco, and starts with the Itaparica cataracts. Paulo Afonso Falls are situated in the lower reaches of that cataract. After leaving these falls, the river enters a great canyon which extends to the City of Piranhas.

The high waters normally run through Paulo Afonso during February, and are of a relatively short duration, not lasting more than 72 hours, with the water level then rapidly descending until the beginning of April. The waters decrease more slowly from April until October or early November, when they again commence to rise. The maximum level is 285 feet, and the minimum level is 187 feet. The average level is approximately 216 feet. The total power of the falls would be 28,248 cubic feet per second of usable discharge, or a maximum of 660,000 kilowatts, a minimum of 446,000 kilowatts, and an average of 530,000 kilowatts.

Reports on Brazilian Projects

A United States construction engineer spent 2 months this spring in Brazil at the invitation of that Government. He visited hydroelectric projects now under construction as well as the proposed site of the Paulo Afonso Falls power plant, comparing plans developed by Brazilian engineers with his findings. It is understood that the Brazilian plans were in general found acceptable, and such modifications as he recommended did not materially alter relative costs. However, the costs originally estimated by the Brazilian engineers on all phases of construction were greatly advanced in his report. Excerpts from his preliminary report follow.

"Paulo Afonso Falls on the lower Sao Francisco River in northeastern Brazil is largely unutilized at present. Advances in hydroelectric development and transmission would make utilization of this power site economically feasible. The minimum flow in the Sao Francisco and the available head would allow a total installation of about 450,000 kilowatts, which should be divided into eight units, each having a capacity of 56,000 kilowatts.

"The area, which could be reached by the transmission lines, would extend from above Recife in the north to Salvador in the State of Bahia in the south. In this area at present, there is an installed capacity of about 70,000 kilowatts in many plants of varying sizes and types. Power shortage and rationing are general because of lack of capacity or poor and broken-down equipment. As a result, present business is stifled and no new business attracted because of the undependable supply and cost of power. Costs of power from Paulo Afonso Falls at primary sub-stations at the load centers would be a small fraction of the present cost in these areas.

Proposed development.—"The proposed development would consist of the following principal features:

"1. Use the Braca de Velho Eugenia as an approach channel. Close off the channels on the right bank except for a controlled entrance to Braca Capuxu, which supplies the small plant. Close the last channel on the left bank with muck from the canal.

"2. Build a simple intake structure, which would be controlled by stop logs, at the foot of Velho Eugenia and at the canal entrance.

"3. Excavate an open canal from the head works to the brink of the slope above the power house. The canal would be about 13.5 feet deep and 300 feet wide, which would give sufficient capacity for the ultimate development.

"4. Build a concrete intake structure with control gates and a spillway to a suitable natural channel on the left side. Butterfly valves would be installed at the head of the penstocks, which would have automatic and remote-control features. Suitable temporary gates would close off the openings for future penstocks.

"5. Short penstocks, about 18 feet in diameter, would extend from the intake to the turbines in the powerhouse.

"6. The powerhouse would be an outdoor type structure, similar to the Hiwassee powerhouse of the TVA. The initial development would consist of two units, each having a capacity of 56,000 kilowatts, the turbines being of the Francis type. The initial development would consist of erection bay, control room and offices at the downstream end of the powerhouse, and the two units extending upstream. Additional units would further extend the powerhouse upstream.

"7. The switchyard would be located at the downstream end of the powerhouse on a fill, which would put it above flood levels.

Digitized by Google

"8. Primary transmission lines at 154,000 volts would extend to:

A. The Recife area, with extensions at 110,000 volts to Maceio and Joao Pessoa areas,

B. Salvador area,

C. Proprio with extension at 110,000 volts to Aracaju,

D. Temporary terminus near Belem about 125 kilometers upstream from Paulo Afonso.

"9. Primary substations on the 154,000 and 110,000-volt lines.

"Present facilities should be used wherever possible for the transmission at lower voltages and the distribution of power. Certain additions and improvements would, no doubt, be required to provide adequate service.

"The use of certain regulating facilities would be desirable at the principal load centers. Power factor control at the end of a long transmission line is necessary to that good motor efficiency can be insured for the industrial load.

"The line to Proprio would allow the establishment of a fertilizer industry .... The phosphate deposits of the State of Alagoas would be utilized and the concentrated phosphate fertilizer shipped by rail or by water to the agricultural areas along the coast or to new irrigation areas in the interior. The transmission line upstream would allow pump irrigation from the river to large suitable acreage on both banks of the stream. This line could be extended upstream for a distance of 200 miles or more as the irrigation development was advanced.

"The uses of an open canal, which would have sufficient capacity for the ultimate development rather than a series of tunnels, each of which would serve only two units, is largely a matter of economy. Experience of the TVA and of other areas where a cheap and dependable power supply was made available indicates that there will be a very rapid growth in the power demand. Since the production of the first two units can be absorbed nearly from the outset, any increase in the demand must be met by the installation of additional units. Therefore, I believe that the installation of units 3 and 4 will be started as soon as the first two units are in production. The cost of two tunnels is equal to the cost of the full canal.

"Additional tunnels would materially increase the cost above the canal cost. Excavation of a tunnel less than 100 feet away from a tunnel under operating pressure would be greatly hampered by water seepage. The rock at Paulo Afonso is a very good granite but it is cut by many dip and strike joints which would carry water fairly readily.

"The powerhouse and switchyard arrangement would follow TVA practice .... I recommend the use of 154,000 volts for the highest transmission voltages rather than 220,000 volts because TVA experience indicated that 154,000 volts will be ample for the distances and loads involved. When the load has materially increased, the primary lines could be increased to 220,000 volts at a reasonable expense. The initial installation expense of the transmission lines could, in that way, be kept at a minimum.

Cost of power (initial development).—"Preliminary cost figures, allowing a contingency item of $4,400,000, give a total cost of $28,000,000 for the initial development of two units. I believe that this total can be materially reduced, but the project is found to be economically sound even with this liberal estimate. Further study will probably reduce the total cost by $1,000,000 to $3,000,000. Power factor control facilities in Recife and Salvador would probably add about $3,000,000 to the total capital cost of the project ....

"If sales amount to 440,000,000 kilowatt-hours, which allows a 50 percent load factor and 10 percent line loss, the cost of power at primary substations would be 0.685 cents per kilowatt-hour. The load factor of the TVA system is over 56 percent and that of the Sao Paulo Tramway, Light and Power Company is over 60 percent. If smaller amounts of power were to be absorbed in the early period of operation, the wholesale costs would be as follows:

Cost of Power at Primary Substations

Amount sold (Million Kw.-hr.)	*Wholesale cost (Cents per Kw.-hr.)*
200	1.5
250	1.2
300	1.0
350	0.86
400	0.75
440	0.685

Distribution of power.—"It is assumed that a large portion of the final distribution of power would be made by cooperatives and municipalities .... These distribution organizations can and must be set up on a businesslike basis and operate on a minimum profit.

Cost of Power to the Consumer

Amount sold (Million Kw.-hr.)	*Retail cost (Cents per Kw.-hr.)*
200	2.88
250	2.31
300	2.03
350	1.74
400	1.62
440	1.47

"The present retail of power to the consumer is 5 cents per kilowatt-hour in Recife and 4 cents in Bahia. For the consumers of the smaller municipal systems, the cost has been even higher.

"Past experience indicates that the use of electricity increases very rapidly in any area where cheap and dependable power is available. Therefore, it may be expected that at least 250 or 300 million kilowatt-hours may be sold in the first full year of operation. The cost of retail power for the first 2 or 3 years of operation might be set at 2 cents per kilowatt-hour and later reduced as sales justify.

Additions to plant.—"Additions to the generating plant would not be costly and could be made with no interference to operation of the initial plant. The transmission lines should be extended at that time, particularly to the irrigation areas. When the full capacity of the first four units (at 50 percent load factor) is absorbed, the wholesale cost at the primary substations will be 0.54 cents per kilowatt-hour. For smaller amounts of power utilized in intermediate periods, the wholesale costs would be as tabulated below:

Cost of Power at Primary Substations

Amount sold (Million Kw.-hr.)	*Wholesale cost (Cents per Kw.-hr.)*
400	1.19
500	0.96
600	0.80
700	0.68
800	0.60
880	0.54

"The retail cost of power would also decrease rapidly as larger blocks of power were utilized and would be close to 1 cent per kilowatt-hour when the full four units were utilized ....

Power frequency.—"The question of power frequency should be given very serious consideration before construction of the new and unified system is started. Recife and many other small areas now operate on 50 cycles. Salvador and other areas are on 60-cycle frequency. Generators and primary transformers can be built by any manufacturer for any specified frequency. However, the standard equipment, which is readily available, especially motors and small appliances, is built for 60-cycle operation and can only operate at 50 cycles at a materially reduced efficiency. Therefore, I recommend the use of 60-cycle frequency in order to take adavantage of lower costs due to mass production.

Construction and design.—"Construction of the power plant and transmission lines for the initial two units will require about 3 years if the proper organization and equipment are used. In view of the complexity and magnitude of the problems, it is felt that the initial development should be entrusted to a contracting firm of international experience.

"The general design and supervision of construction should also be done by experienced personnel. An arrangement is now in force between the United States Bureau of Reclamation and the Chinese Government for the design of the Yangtze development. A similar arrangement might be made with the Bureau of Reclamation or the Tennessee Valley Authority for the general design of the Paulo Afonso project. Details of the design should be made on the job by an organization that was largely Brazilian.

"Training of Brazilian personnel for design and supervision of construction should be intensively followed so that later steps of development can be solely, or largely, Brazilian.

Conclusions.—"Development of the Paulo Afonso Falls can be made economically to supply power to a large potential market. Production and

Digitized by Google

transmission of power to these market centers present no difficult engineering problems.

"Production of power should be coordinated with irrigation developments in the surrounding areas. Fertilizer production to improve the land fertility should be started, if the phosphate deposits in the State of Alagoas can be economically utilized."

Additional Appropriations

As evidence of the continued interest in this project by the Brazilian Government is the fact that an additional credit of 4,175,533 cruzeiros was placed in the Banco do Brazil on April 18, 1946, to pay for required equipment previously purchased.

Legislation Pertinent to Hydraulic Resources

In 1933, the Brazilian Government, in its interest in the development of native hydraulic resources, organized the Water Service (Decree No. 23,016) as a part of the National Department of Mineral Production of the Ministry of Agriculture.

The functions of the Water Service include the studying and charting of the hydraulic resources of the country; working out plans for their utilization, for irrigation, and other purposes; organizing records of the utilities and existing plants; and to act in an advisory capacity in the granting of concessions.

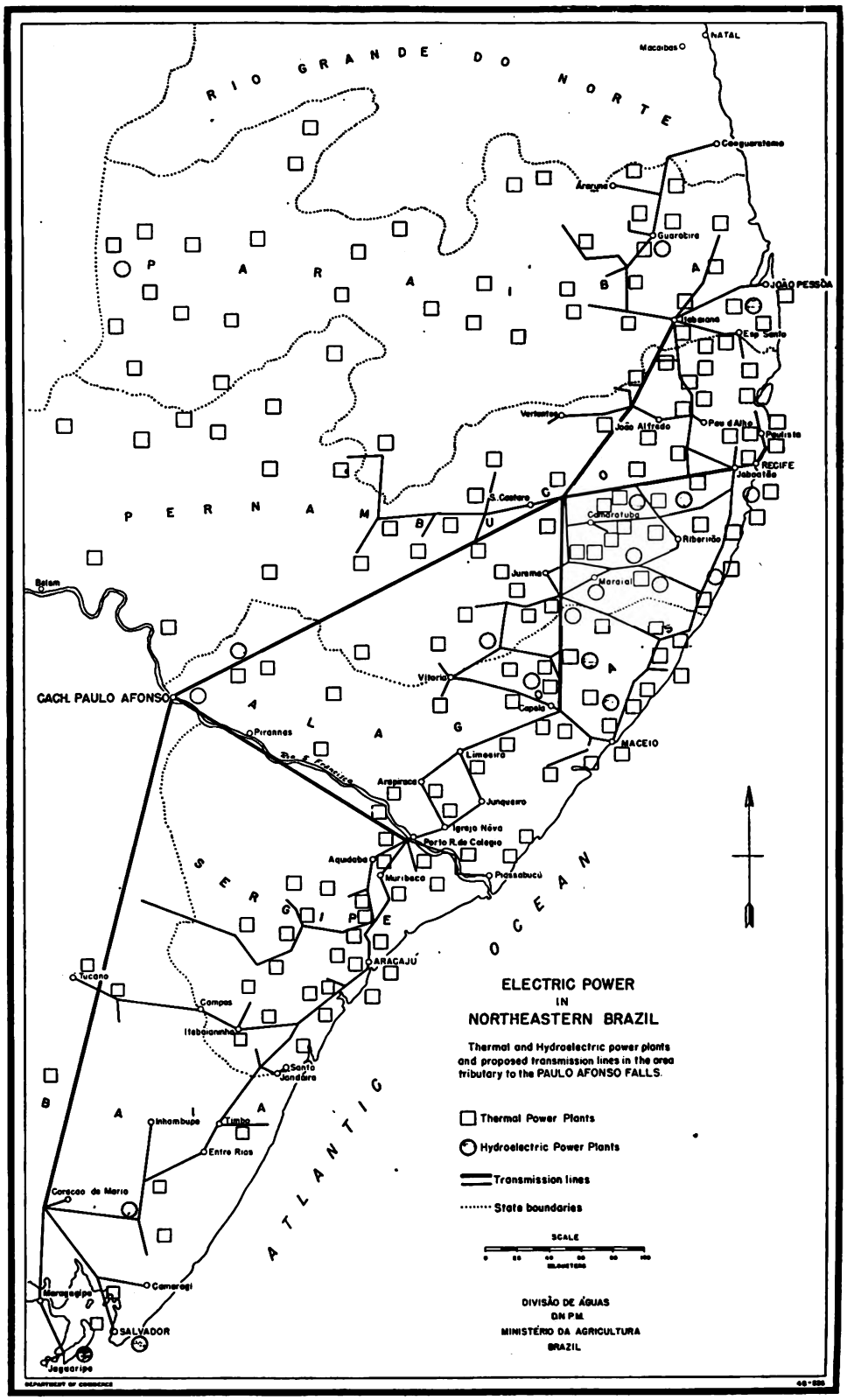
This legislation was followed in July 1934, by Decree No. 24,643, which created the Water Code and which was consolidated with Decree No. 1,285 (May 18, 1939), thereby creating the National Board of Water and Electric Energy.

All matters pertaining to water resources and hydroelectric energy were under the jurisdiction of two Government bodies as a result of this procedure. These agencies, namely, the Water Division of the National Department of Mineral Production of the Ministry of Agriculture, and the National Board of Water and Electric Energy, are directly subordinate to the Presidency of the Republic.

By the adoption of the Water Code in the Brazilian Constitution of 1937 (Decree No. 852 of November 1, 1938), new concessions can only be granted to Brazilians or societies consisting only of Brazilians. The unification of the cycles of electric energy, mentioned elsewhere in this report, is also established in this Decree-Law.

Decree No. 1,345 of July 14, 1939, provided for regulating the supply of electricity among the respective companies, as well as the turning over to the Government of the reserves of water necessary to meet civic demands.

Other laws are also now in effect which limit the profits permitted, the costs of current, and the rationing of the supply of electricity.



Power Plants

It was not until 1883 that the first electric power plant, thermally operated and with a capacity of 50 kilowatts, was built in Brazil. Three additional plants—one hydroelectric and two thermal—were built in the State of Minas Gerais in 1889, and by 1900 there were six hydroelectric and six thermal plants operating in the country, all of which had a combined generating capacity of slightly more than 10,000 kilowatts.

At the present time, thermally operated generating stations predominate in the southern, northern, and northeastern parts of Brazil. In the southern part, where the coal mines are located, thermal operation is cheaper. The un-

Digitized by Google

developed water power resources of the northeastern section of the country, and the general lack of economic progress there, lead to the more widespread use of thermoelectric generation in those areas.

The accompanying map indicates the numerous thermoelectric centrals in comparison with those generating electricity by the use of water power.

In 1940, more than 80 percent of Brazil's electric power plants were located in the central section of the country, which comprises the States of Sao Paulo, Minas Gerais, and Rio de Janeiro, as well as the Federal District. Of the total hydroelectric installed capacity of the country, 92 percent is in these three States, and also 74 percent of the country's hydroelectric plants. In the same year (1940), the seven Northeastern States, in addition to the southernmost State of Rio Grande do Sul, possessed more than one-half of the country's installed thermic capacity, and approximately 68 percent of the thermically operated centrals.

Table 2 shows the installed capacity in kilowatts, of the thermal and hydroelectric power plants located in the various States of Brazil in 1940.

TABLE 2.—*Installed Capacity of Electric Power Plants, by States, 1940*

[In kilowatts]

State	Installed capacity		
	Hydro	Thermal	Total
Sao Paulo	549,156	15,300	564,456
Rio de Janeiro	245,955	11,472	257,427
Minas Gerais	122,689	7,820	130,509
Rio Grande do Sul	9,584	48,432	58,016
Pernambuco	4,248	33,045	37,293
Bahia	15,542	7,216	22,758
Parana	14,681	1,644	16,325
Santa Catarina	13,643	1,740	15,383
Para	.....	14,527	14,527
Rio de Janeiro (Federal District)	375	12,812	13,187
All others	17,869	39,132	62,001
Total	993,742	193,140	1,186,882

At the present time there are 1,808 electric power plants in Brazil, with a total installed capacity of 1,230,865 kilowatts, of which 989,515 kilowatts are generated in the country's 906 hydroelectric plants and 211,670 kilowatts are generated in the 874 thermally operated plants. There are 28 combination power plants supplying both thermal and hydroelectric energy. In these plants the remaining 29,720 kilowatts of electricity, which make up the country's total, are produced.

The annual production of electricity in Brazil approximates 2,620,761,111 kilowatts annually, or 65½ kilowatt-hours per capita.

Electric Current Characteristics

Electricity in Brazil is generated at 50 cycles, as set by law. However, the actual decision as to whether new installations will be 50 or 60 cycles is determined by the Divisao de Aguas, which takes into consideration the possibility of present or future interconnecting of systems. Sao Paulo is the principal industrial area of Brazil, and its industries operate on 60-cycle current, as the Government found the expense to the industries in the conversion to 50 cycles too costly. The law requiring 50 cycles is not enforced except for new installations, where that type of current predominates. Therefore, Brazil has both 50- and 60-cycle zones.

☆ U. S. GOVERNMENT PRINTING OFFICE: 1946—707799-133

Digitized by Google

A New Service

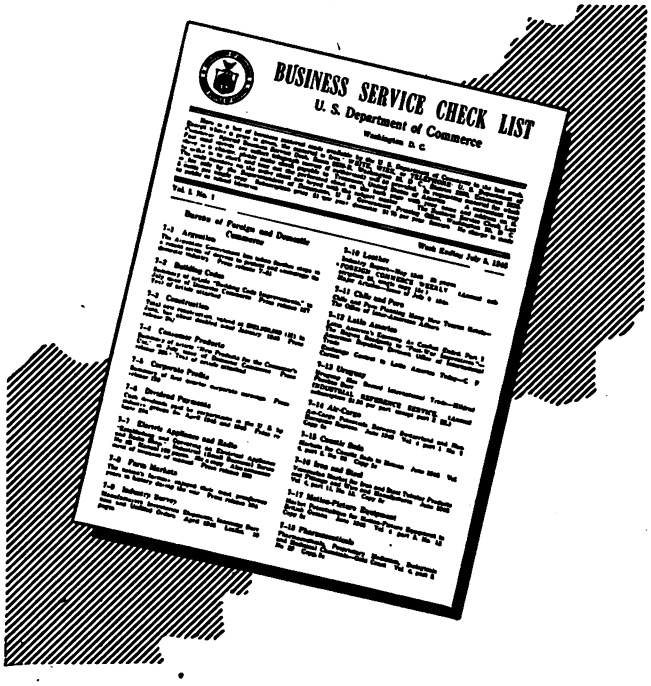
by the U. S. DEPARTMENT OF COMMERCE

BUSINESS SERVICE CHECK LIST

The U. S. Department of Commerce itemizes all news releases, publications, speeches, pamphlets, and books published the previous week in its weekly Business Service Check List. This listing will enable you to order the material that will be of specific aid to you in your business.

Typical of the listed material that will interest you are marketing data, articles on specific industries and business, foreign markets, establishing and operating numerous kinds of small businesses, and foreign industrial wartime secrets.

Many of the items in the BUSINESS SERVICE CHECK LIST are free.



The listing covers these Bureaus and Offices:

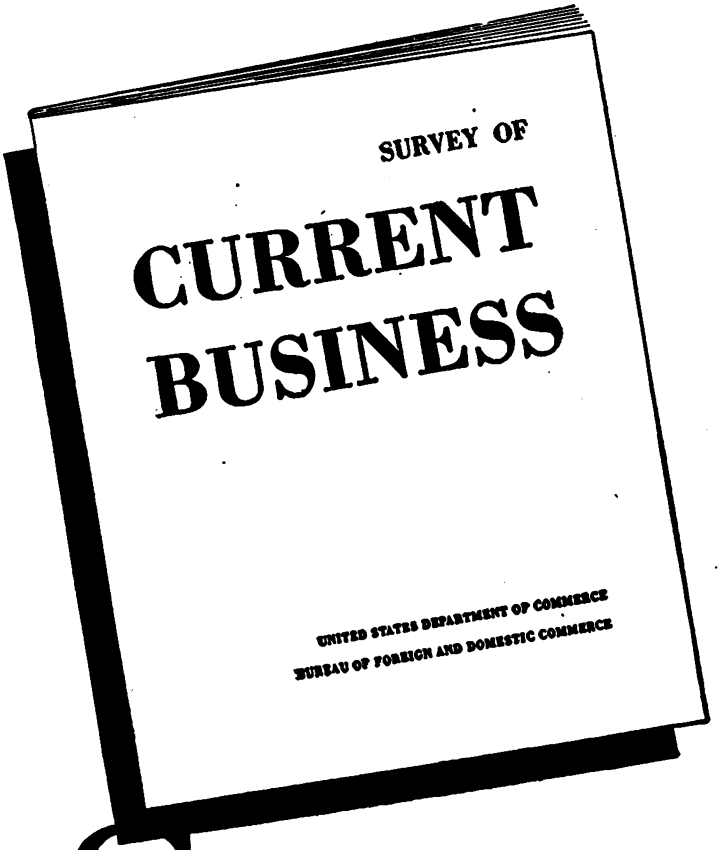
- Census Bureau
- Civil Aeronautics Administration
- Coast and Geodetic Survey
- Foreign Trade Zones Board
- National Bureau of Standards
- Office of Business Economics
- Office of Domestic Commerce
- Office of International Trade
- Office of Small Business
- Office of Technical Services
- Patent Office
- Weather Bureau

Annual subscription **$1** *A sample copy will be sent on request.*

Order today from the

Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

Digitized by Google



$2.00
per year

SURVEY OF CURRENT BUSINESS

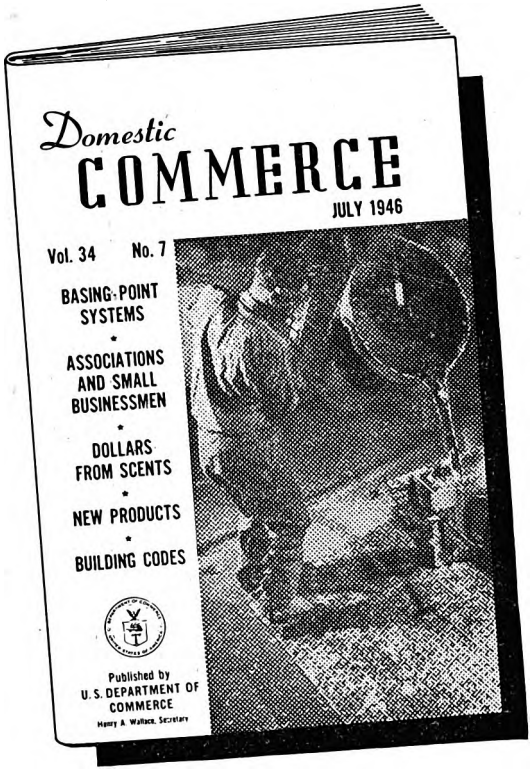
THIS AUTHORITATIVE MONTHLY PERIODICAL makes easily available to businessmen over 2,200 comprehensive facts about production, stocks, orders, prices, sales, shipments, etc., of the industries of the United States by means of text, tables, charts, and index numbers.

A sample copy will be sent, on request to the
Bureau of Foreign and Domestic Commerce,
Washington, D. C.

$2.00 per year, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Digitized by Google

Every Businessman Could Profit by Reading . . .



Pocket Size

DOMESTIC COMMERCE

96 Pages of Facts and Ideas!

- Timely news on problems that face businessmen today.
- Marketing information on numerous business activities.
- Economic surveys and trends.
- New products being designed for consumer use.
- Progress and changing conditions of industry and business.
- Monthly listing of all business service material published by the U. S. Department of Commerce.
- What's New—a regular feature on patents dedicated for public use, and new and abandoned patents.

These are typical of the material currently appearing. Articles written by specialists in the U. S. Department of Commerce as well as those of other governmental agencies.

Annual Subscription $1

Order today from the

Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

(Make check payable to Treasurer, U. S. A.)

Digitized by Google

ocuments Room

Industrial Reference Service

U. S. DEPARTMENT OF COMMERCE, W. AVERELL HARRIMAN, *Secretary*

Office of International Trade, ARTHUR PAUL, *Director*

Part 1. TRANSPORTATION and PUBLIC UTILITIES

Available in Parts Covering Selected Services and Commodities
Annual Subscription $1.50. Price this report 5 cents
For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., or any of the Department's Field Offices

Volume 4—Part 1 | November 1946 | D 17390 | Number 29

Highways of Venezuela

By Elisha E. Early, Transportation and Communications Division, Special Services and Intelligence Branch

Based on reports of Foreign Service Officers, United States Embassy, Caracas, and other official reports



INDIANA UNIVERSITY
JAN 16 1947
LIBRARY

Section of highway between La Guaira and Caracas. (Note highway enclosed by fence constructed of railway rails.)

Digitized by Google

Highways of Venezuela

Highways of Venezuela

This series of Latin American highway reports is designed to present data concerning the highway mileage and type of construction, adequacy of the highway system in terms of economic needs, and national policy in regard to new road construction. It is believed that this information will aid the motor vehicle, construction machinery, and equipment industries in making analyses of market potentialities in these countries not only for a short-range program in the immediate postwar years, when equipment depreciated and retired during the war will be replaced, but for a longrange program in the later years when the present demand for replacements will have been met.

General Information

The Republic of Venezuela has an area of 352,143 square miles, and a population, according to the 1941 census, of 3,951,371. Venezuela is bounded on the north and northeast by the Caribbean Sea, on the east by British Guiana, on the southeast by Brazil, and on the west and southwest by Colombia. Caracas, with a population of 269,030 (1941 census), is the capital. The monetary unit of Venezuela is the bolivar, equivalent to $0.2985 in United States currency.

Geographically the Republic may be divided into four regions: the Guayana Highlands, the central plains or llanos, the mountainous region of the Andean and Coastal ranges, and the Maracaibo lowlands. The climate is tropical in the central llanos and coastal regions, temperate at altitudes between 1,800 and 6,000 feet, and cold in the higher sections. There are no seasonal fluctuations in temperature but, characteristic of the tropics, there are wet and dry seasons.

Petroleum and its derivatives, coffee, cacao, gold, cattle, and mineral products are the principal exports of the country. Venezuelan exports amounted to $257,332,000 in 1943, compared with $92,391,000 in 1932. In 1943 approximately 91 percent of total exports by value consisted of petroleum and its derivatives.

Principal imports of Venezuela consist of cotton textiles, chemical and pharmaceutical supplies, iron and steel manufactures, machinery, paper and its manufactures, canned milk, wheat flour, and automobiles, trucks, and accessories. Imports for 1943 were valued at $66,285,000. Venezuela's leading import in 1943 was cotton textiles, valued at $6,147,000.

The only land approach to Venezuela is by highway from Colombia. Other approaches are through the various ports, of which La Guaira is the most important. The east central area is reached by the Orinoco River. The important port of La Guaira is close to the traffic stream that plies the Panama Canal, and is normally served by steamers from all parts of the world, as are Ciudad Bolivar, Puerto Cabello, and other ports. International airline connections are furnished by the Pan American and Royal Dutch Airways. Facilities for communication to Venezuela are very good, as radiotelegraph and cable services are maintained.

TABLE 1.—*United States Exports of Road-Building Equipment and Machinery to Venezuela, 1944 and 1945*

Type	1944		1945	
	Number	Value	Number	Value
Excavators including power shovels	17	$217,685	28	$292,097
Excavator parts and accessories	.....	73,665	.....	190,871
Concrete mixers	158	138,356	254	271,510
Road rollers	14	53,334	19	46,210
Graders, self-propelled	27	140,660	47	227,485
Graders, pull or push	5	7,981	7	2,943
Graders, other	1	2,987	11	31,748
Scrapers, self-loading	15	88,150	49	221,087
Bull dozers, angles dozers, etc	26	43,138	97	154,054
Other road machinery and parts	.....	272,180	.....	406,457
Air compressors, stationary and portable	106	160,430	356	323,199
Track-laying tractors, carburetor	16	44,210	39	66,306
Tractors, injection	61	396,994	112	614,158
Total	446	1,639,770	1,014	2,848,130

TABLE 2.—*Principal Highways of Venezuela*

From	To	Length		Notes on condition of highway
		Kilometers	*Miles*	
Caracas	San Antonio del Tachira	1,141	708 9	Paved with concrete from Carcacas to El Palito (also to Puerto Cabello), and a bit beyond San Cristobal. Average width is 6 meters and, where not paved, the surface is of earth stabilized with gravel. Bridges for loads H-15 [1].
Caracas	Machiques	990	615.2	From Motatan to Palmarejo this road is stabilized with bituminous materials. Average width 6 meters. Bridges for load H-15 [1].
Caracas	Pedraza	621	385.9	Concrete paved from Caracas to a point 31 kilometers from Valencia. The remainder of the road is earth stabilized with gravel with the exception of a section 75 kilometers long between Guanare and Barinas which is not permanent. The average width is 6 meters. Bridges for loads H-15 [1].
Caracas	Upata	927	576.0	Paved with concrete from Caracas to San Juan de los Morros and is stabilized with asphalt for 78 kilometers between Santa Maria de Ipire and Pariaguan. The remainder is earth stabilized with gravel. Width 6 meters. Bridges for loads H-15 [1].
Caracas	Rio Caribe	1,064	661.1	From Santa Maria to Pariguan and from El Tigue to Guanta this road is stabilized with bituminous materials. As far as El Tigue the average width is 8 meters; for the sector, El Tigue to Guanta, the average width is 6 meters. The remainder of the road is earth. Bridges are for loads H-15 [1].
Caracas	Los Morros de San Juan	995	618.3	This road likewise constructed by an oil company has characteristics similar to those of the El Tigue to Guanta road.
Caracas	Higuerote	117	72.7	Road paved with concrete as far as Petare. The remainder of the road is earth stabilized with gravel. Average width 6 meters. Bridges for loads H-15 [1].
Caracas	Anara	72	44.7	Road paved with concrete from Caracas to point 4 kilometers beyond La Guaira. Average width 6 meters. Bridges for loads H-15 [1].
Caracas	Ocumare del Tuy	71	44.1	This gravel-surfaced road average width 6 meters, bridges for loads H-15 [1], extends into an agricultural region in the valley of the Tuy River.
Caracas	El Junquito	20	12.4	This road is being extended westward toward Colonia Tovar, about 40 kilometers air-line distance.

[1] Approximately 15 tons capacity.

Digitized by Google

Maritime Ports

La Guaira, Puerto Cabello, and Maracaibo are the principal ocean ports with highway connections. Ports of less importance are Puerto La Cruz, Guanta, Cumana, Campano, Ciudad Bolivar, and Turiamo.

Inland Waterways

A highway connection with the important Orinoco River system is made at Ciudad Bolivar. Maracaibo is the transfer point for traffiic on Lake Maracaibo and the surrounding area.

Highway Development

According to figures released by the Ministry of Public Works as of August 1945, the highway system of Venezuela totaled 8,835 kilometers (5,489.1 miles).

The following data show the types of road construction in kilometers and miles for the period mentioned above.

	Kilometers	*Miles*
Unimproved earth and nonsurfaced	2,460	1,528.4
Asphalt surfaced or stabilized	1,160	720.7
All weather roads, earth or gravel	4,645	2,885.9
Concrete paved	570	354.1
Total	8,835	5,489.1

Figures for mileage of unimproved earth and nonsurfaced roads, as given by the Ministry of Public Works, are believed to be conservative.

The mileage of trails throughout Venezuela is unknown. It has been estimated to be approximately 2,540 kilometers (1,578.1 miles). Most of the trails are in the vicinity of Lake Maracaibo; however, there are scattered trails in other parts of the country, these being mostly in the remote and less densely inhabited areas.

The Pan American Highway does not pass through Venezuela; however connection with this important artery is made through the Colombian highway system, with which Venezuela's "Carretera Transandine" or "Internacional" connects at San Antonio del Tachira.

Highway Planning and Financing

General

The Ministry of Public Works of the Federal Government has the responsibility of making plans and studies for the construction, improvement, and maintenance of Venezuelan roads. Work for the construction or maintenance of the highways is usually done directly by the Public Works Office. However, in a few cases such jobs may be let by contract to private firms.

Funds are provided by the Federal Government, including even those employed by State governments which are provided by the Federal Government through its special contributions to the State governments.

Road Budget

The Federal budget for roads for the fiscal year, 1944–45, as increased by supplementary appropriations during that period, amounted to Bs. 27,586,540. Of this amount, Bs. 6,801,140 were for road maintenance and Bs. 19,985,400 for construction. In addition, Bs. 800,000 were provided for studies in connection with new roads and improvement of existing roads. The 1945–46 budget provides for expenditures of Bs. 13,962,000 for road construction, Bs. 7,250,000 for maintenance, and Bs. 300,000 for surveys.

The contribution to the development of the highways of Venezuela by the petroleum companies has been of great importance. Some of the best-engineered roads have been constructed by them, and studies for additional projects are in progress.

Major Projections

The Federal Budget for 1945–46 calls for major road works, both in new construction and rebuilding, as indicated in the following listing:

San Juan de los Morros-Chaguaramas-Valle de la Pascua
Caucagua-Higuerote
Valle de la Pascua-Zaraza
Upata-El Callao
Barinas-Apartaderos
Valencia-Acarigua
Moron-Coro
Barquisimeto-Carora
Barquisimeto-El Tocuyo-La Plazuela
Valera-Timotes
San Cristobal-Barinas
San Cristobal-San Antonio del Tachira

The State Governments of Carabobo, Zulia, Sucre, and Yaracuy have undertaken the following new road projects:

Valencia-Canoabo
Maracaibo-Mojan
Irapa-Yaguaraparo
San Felipe-Aroa

Work has been started on a road between El Sombrero to Puerto La Cruz. This project is being carried forward by a group of petroleum-producing companies and, when completed, will be of great utility in shortening communications between Caracas and Eastern Venezuela.

Materials and Equipment

Apart from native gravel, clay, and earth, the materials used for road construction and maintenance are asphalt and petroleum obtained from local sources, as well as cement both of domestic production and imported. Steel is imported from the United States as are machinery and equipment.

Venezuela has been a good customer for road-construction machinery and equipment since the country embarked on a plan for the construction and maintenance of a national highway system. The importance of this market is indicated in table 1.

The table of exports includes most of the types of equipment utilized in highway construction and maintenance, but much of it is used also in railway and general construction, and many other items such as hand tools, shovels, picks, and others common to all kinds of construction are of importance among the exports to Venezuela.

United States road-building firms established in Venezuela have a fair chance of being awarded contracts; however, such firms located in the United States, and not having a representative or an office in Venezuela, have but little chance of obtaining contracts for highway construction.

Equipment employed by the Ministry of Public Works as of the close of 1944 is shown in the following list:

Type of equipment	*Number*
Tractors	130
Bulldozers	80
Power shovels	35
Rollers	34
Rock crushers	26
Mixers	143
Compressors	170
Motor pumps	168
Tower hoists	9
Electric plants	42
Perforators	5
Motors	80
Hoists	20
Welding plants	42
Drilling units	43
Motor winches	9
Concrete pourers	74
Trailers	46
Levelers	26
Harrows	21
Sheep-foot rollers	20
Ditch diggers	13
Pneumatic hammers	595
Hand pumps	177
Power units	107
Dump trucks	310
Stake-bodied trucks	62
Tank trucks	33
Pick-ups	76
Station wagons	112
Automobiles	89
Ambulances	28
Earth-hauling units	11

Principal Highways

Table 2 shows the principal highways of Venezuela, giving length, terminal points, and condition of the roads. Caracas is the focal point of all land transportation in Venezuela.

Motor-Vehicle Registrations

A break-down by types of motor vehicles registered as of January 1, 1944, and January 1, 1945, appears in table 3.

TABLE 3.—*Types of Motor Vehicles Registered, 1944 and 1945*

Type of vehicle	Jan. 1, 1944	Jan. 1, 1945
Passenger cars	18,109	15,095
Trucks	14,734	12,573
Busses	1,396	1,288
Trailers	60	240
Motorcycles and other three-wheeled vehicles	996	696
Total	35,295	29,892

Digitized by Google

Only the strain placed on truck transportation by wartime shortages of trucks and tires has enabled the railroads to withstand the competition from highway transportation which, until the war interrupted the trend, had greatly reduced the traffic volume on the railroads. It is believed that when trucks and tires are again available the railroads, unless reorganized and modernized, will suffer a decline of major importance.

A more flexible and faster transportation service is offered at present by trucking facilities than by the railroads. The railroads have fallen so in prestige that it is doubtful that they will offer the highways much competition in the future.

Bridges

Since it would be impracticable to give a complete list of all bridges in Venezuela, together with descriptive data, and since there are no really major bridges on local highways, some general data are given below:

Total number of bridges constructed since 1936—214.

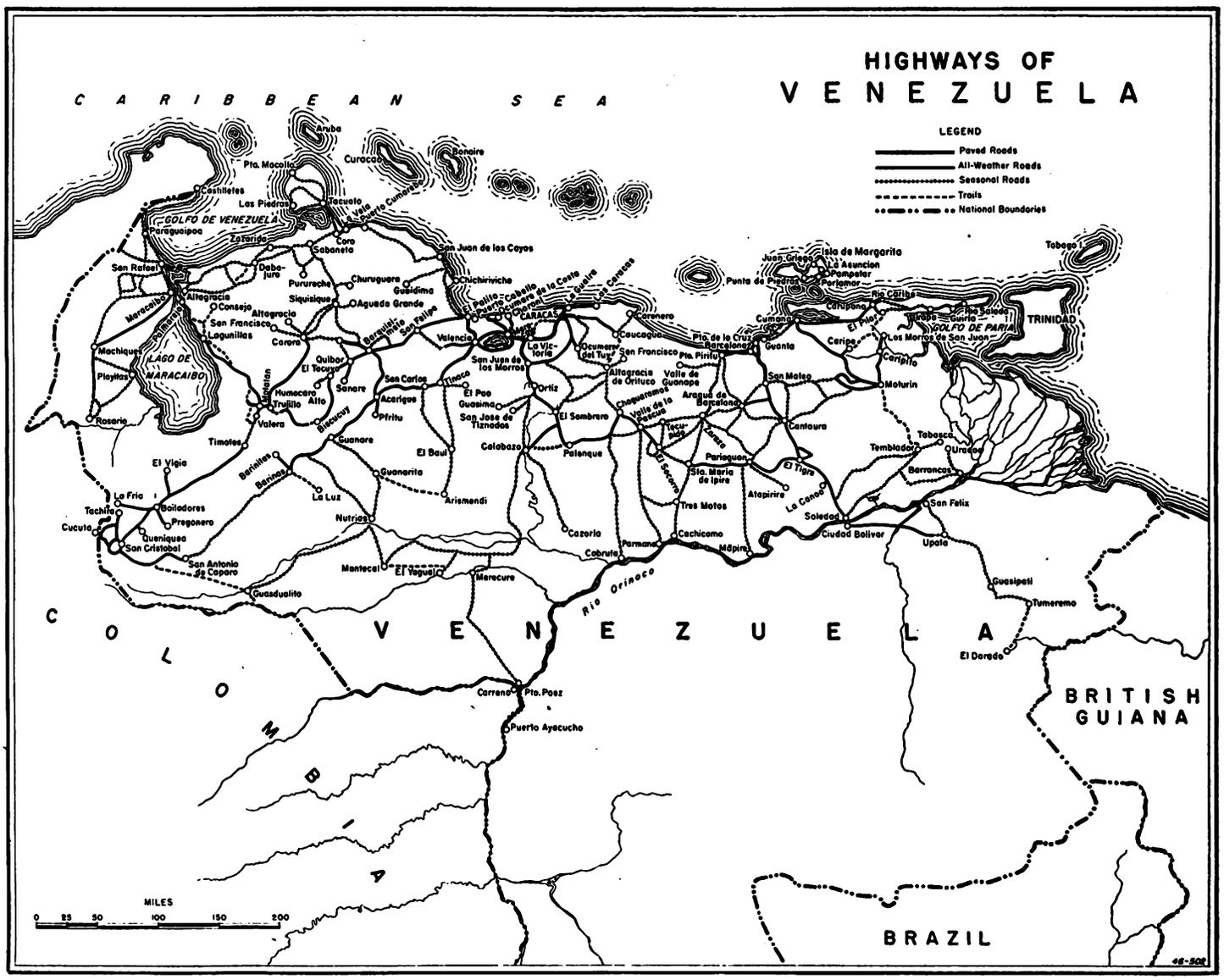
Total distance spanned by bridges—7,339 meters.

Timber or steel beam-supported bridges of less than 10 meters length—932.

In general, all bridges are designed for loads of H-15 impact coefficient factor, or approximately 15 tons capacity.

Foundations, piers, and supports are usually of ordinary concrete but in some cases reenforced concrete is used. Bridges supported from below are usually of steel. Those supported from above, including all longer than 25 meters, are of overhead strutting. Structural steel is used for spans up to 16 meters in length, while reenforced concrete is used for spans up to 20 meters in length. The longest span of structural steel is 75 meters in length, and the longest of reenforced concrete arches is 30 meters. The longest span of suspension bridge is 164 meters. The longest span of straight reenforced concrete beams is 18 meters.

Bridge floors are of reenforced concrete and have 6 meters of free width.



☆U. S. GOVERNMENT PRINTING OFFICE: 1946—707800—157

Digitized by Google

Documents Room

Industrial Reference Service

U. S. DEPARTMENT OF COMMERCE, W. AVERELL HARRIMAN, *Secretary*
Office of International Trade, ARTHUR PAUL, *Director*

INDIANA UNIVERSITY
JAN 16 1947
LIBRARY

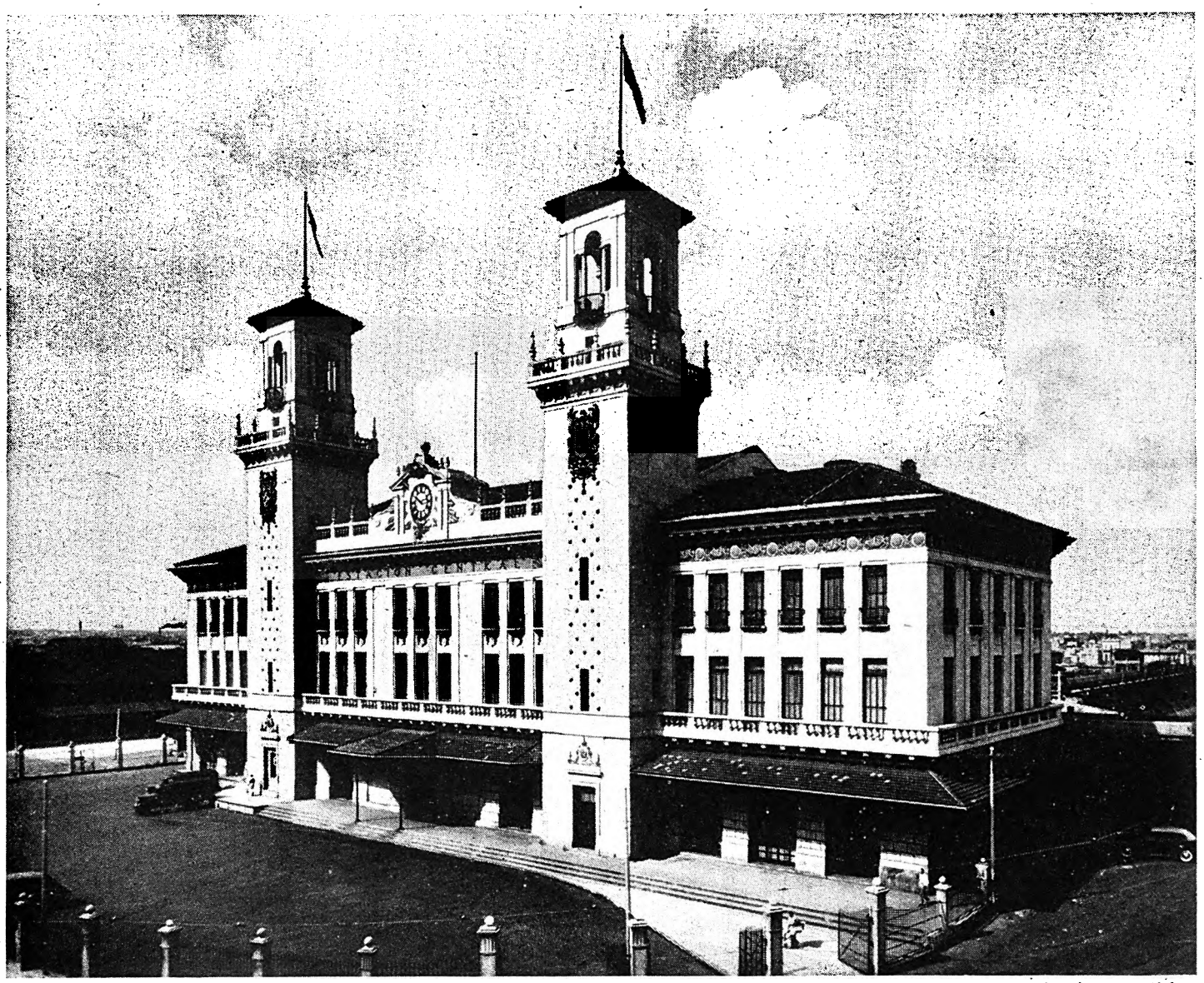
Part 1. TRANSPORTATION and PUBLIC UTILITIES

Available in Parts Covering Selected Services and Commodities
Annual Subscription $1.50. Price this report 5 cents
For sale by the Superintendent of Documents, Government Printing Office, Washington 25, D. C., or any of the Department's Field Offices

Volume 4—Part 1 D 17415 December 1946 Number 30

Railways of Cuba

Report by George C. Howard, Commercial Attache, American Embassy, Habana, Cuba, condensed in the Transportation and Communications Division, Special Services and Intelligence Branch.



Courtesy, Pan American Union

Havana Central Station, United Railways of the Havana.

Digitized by Google

Railways of Cuba

Topography and Climate

Cuba is the largest of the West Indian islands, having an area of approximately 44,128 square miles—about equal in size to the State of Pennsylvania. The island is approximately 780 miles long, with an average width of 50 to 60 miles and a coast line of about 2,000 miles. Lying approximately 90 nautical miles south of Key West, Fla., Cuba is bounded on the north by the Atlantic Ocean and the Gulf of Mexico, on the south by the Caribbean Sea, and on the west by the Gulf of Mexico. Its southeastern section forms the western shore of the Windward Passage.

The topography varies widely, from extensive marshes to mountainous districts, but most of the island may be described as rolling, with numerous wide valleys and plains. In the main, the north coast is steep and rocky and the south coast, with the exception of the eastern end, generally is low and swampy.

The mountains are chiefly in three groups, located at each end of the island and in the middle. The largest group comprises the Sierra Maestra in the extreme east and southeast, principally along the southeast coast. In this region is the Pico Turquino, the highest point on the island, which reaches a height of 7,870 feet. Other ranges, principally the Sierra de los Organos in the west, run parallel to the north coast. The third group of smaller mountains, scattered throughout the middle of the island, centers in the eastern part of the Province of Las Villas.

Rivers are generally short, narrow, and shallow, and few are navigable.

Between the mountains and the coasts are fairly level areas with excellent soil. In the extreme western part lie the famous tobacco plantations, and in the west central and east central parts are extensive plains and valleys.

Cuba's climate is semitropical, tempered by sea breezes. Though located just south of the Tropic of Cancer, which passes between Florida and Cuba, the climate is not entirely tropical because of the tempering effect of the prevailing winds and the ocean. At Habana temperatures average 71°F. in January and 81°F. in August. Temperatures at the eastern end of the island are slightly higher. The warmer (rainy) season begins about the middle of May and continues until the end of October; but even during this period the mornings are bright and clear and the nights pleasant. The cooler (dry) season begins in November and continues until May.

Population and Economy

The population of Cuba, as given by the National Census Bureau Report of 1943, is shown in table 1.

Cuba's excellent soil and mild, humid climate provide conditions favoring agricultural expansion equaled by few countries in the world. These have been the leading factors determining the island's importance as an agricultural and pastoral country, rather than an industrial or manufacturing one. Although Cuba is capable of producing far in excess of all its foodstuffs requirements, until a comparatively few years ago most of its productive energy was devoted to sugar and tobacco as cash crops for export. During more recent years, however, agricultural and industrial diversification has been actively pursued and many commodities formerly imported are now produced locally; moreover, several items formerly of negligible importance now account for a large part of Cuba's export trade.

TABLE 1.—*Population of Cuba, 1943*

Province	Number of inhabitants	Number per square kilometers	Area in square kilometers	Percent of total area
Pinar del Rio	398,794	29.54	13,500	11.8
Habana	1,235,959	150.34	8,221	7.2
Matanzas	361,079	42.76	8,444	7.3
Las Villas	938,581	43.83	21,411	18.7
Camaguey	487,701	18.69	26,098	22.8
Oriente	1,356,489	36.81	36,850	32.2
Total	4,778,583	[1] 41.73	114,524	100.0

[1] Average.

Despite the very considerable progress that has been made in this respect, however, economic conditions remain largely dependent on sugar. The importance of the sugar industry is such that conditions in that industry are immediately reflected in commercial activity throughout the island. This is true also with respect to the tobacco industry, but to a much less extent. Under normal conditions, the influence of the price of sugar, its cost of production, and the size of the crop is paramount and directly determines the purchasing power of the country. This is readily understandable since the sugar industry employs more than 500,000 workers, principally during the harvesting and grinding season, which varies in length from 2 to 5 months. In addition, the number of workers indirectly dependent on sugar for their livelihood is very large.

Although Cuba's economy is based mainly on agriculture, the number of its manufacturing establishments has grown substantially during the past decade or two—the local manufacture of many products was begun following the adoption of the 1927 protective tariff. The commodities manufactured cover a very wide range but do not include products of heavy industry.

Among articles produced in Cuba are cement; iron and steel products including nails, wire fencing, plows, iron and steel furniture; paper and cardboard; wooden and cardboard containers; tin cans; paints and varnishes; soap, perfumeries, and toiletries; prepared fertilizers; candles; leather, boots and shoes; tires and tubes and other rubber goods, including rubber-soled footwear; cotton yarn, cotton and rayon piecegoods, and cotton bags and bagging; hosiery and other knit goods; furniture and other articles of wood; lighting fixtures; razor blades; pins and hairpins; printing and writing inks; motor fuel; adhesive and glue; fiberboard; pottery, bricks, and tile; aluminum and other kitchenware; plumbing fixtures; biologicals and medicinals; glycerin; muriatic and sulphuric acids; disinfectants and insecticides; chlorine gas and caustic soda; and dry ice.

Also included are such products as spirituous liquors; beer and soft drinks; yeast; compound lard, vegetable shortening, and packinghouse products in general; vermicelli and macaroni; tapioca starch; confectionery; flavoring extracts; and biscuits and crackers.

Foreign Trade

In 1938, the last normal prewar year, 28 percent of Cuba's imports consisted of food products; 11.8 percent consisted of machinery, instruments, and vehicles; 10.4 percent, chemicals, drugs, and dyes; and 9.3 percent, minerals. The United States supplied 70.9 percent of all Cuba's 1938 imports.

Exports in 1938 were comprised of sugar and sugarcane products, 78.8 percent; other foodstuffs, 3.6 percent; and tobacco, 9.5 percent. In that year the United States absorbed 76.02 percent of Cuba's exports.

Digitized by Google

These percentage figures are believed to represent a fair division by classes of commodity in Cuba's present foreign trade.

In 1944 Cuba's foreign trade reached a value of approximately $635,770,000, of which exports accounted for nearly two-thirds. The United States furnished $168,841,000 or 80.9 percent of the value of total imports, and absorbed $379,975,000 or 88.9 percent of the value of total exports.

In 1944 Cuba's foreign trade in the principal items of commerce totaled 8,947,157 long tons, divided as follows:

Imports	*Long tons*
From United States	2,329,115
From other countries	121,144
Total	2,450,259
U. S. percent of total	95.1
Exports	
To United States	5,944,229
To other countries	552,669
Total	6,496,898
U. S. percent of total	91.5

Transportation

Highways

Cuba is served by a system of highways, the backbone of which is the Central Highway running from Pinar del Rio to Santiago de Cuba, with tributary roads connecting it with most of the principal cities of the island. Aside from the Central Highway and some of the principal secondary highways, road surfaces are generally bad and travel is necessarily slow.

Funds for the construction and maintenance of public highways and roads in Cuba are appropriated by the National Government and expenditures are supervised by the Department of Public Works. Recently certain road construction and repair have been undertaken under the supervision of the National Development Commission, utilizing funds made available by the Export-Import Bank. Roads in existence as of January 1, 1945, totaled 3,857 kilometers.

Inland Waterways

While Cuba has numerous coastal rivers, there are no important navigable waterways in the island.

Air Routes

Cuba has two domestic aviation companies. The Compania Cubana de Aviacion, a subsidiary of Pan American Airways, operates throughout Cuba, serving Habana, Camaguey, Manzanillo, Bayamo, Baracoa, Antilla, Santiago de Cuba, Guantanamo, Preston, Cayo Mambi, Varadero, and Cienfuegos. Expreso Aereo Inter-Americano, which commenced operations in 1943, operates a freight-express service between Habana and Miami; an express and passenger service Habana and the Isle of Pines; and a passenger service between Habana, Santa Clara, and Varadero.

Pan American operates the route between Habana and Merida, and through its subsidiary — Compania Mexicana de Aviacion—continues the service through to Mexico, D. F. TACA operates Miami-Habana-Ciudad Trujillo to Venezuela. KLM operates Miami-Camaguey-Kingston-Curacao.

Seaports

In prewar years Habana, the principal port of Cuba, handled 82.8 percent of the island's imports and 27.4 percent of its exports. Imports are more concentrated than are exports. The 4 ports of Habana, Santiago de Cuba, Cienfuegos, and Nuevitas handle around 93 percent of imports while 11 ports handle 84.8 percent of exports.

The Railways of Cuba

The total first-line railroad trackage in Cuba operated by public service railroads amounts to 4,851 kilometers, of which 4,009 kilometers are main line and 842 kilometers are branch line. In addition, yard-line and switch trackage amounts to 1,003 kilometers.

In addition to the public-service railways, the sugar mills of Cuba operate a total of 11,323 kilometers, divided as follows:

Gage	*Kilometers*
Standard	6,809.0
36-inch	2,691.0
30-inch	1,602.0
All other	220.5

Of this total, 435 kilometers operated by the sugar mills for public-transport purposes are included in the public-carrier mileage. The mileage of track operated by the mills for purely industrial purposes is 10,888 kilometers, or nearly twice that operated by the public-service railroads.

The nine principal railways which together operate 94.5 percent of the first-line track in public service in Cuba are as follows:

	Kilometers
United Railways of Habana	2,223
Cuba Northern Railways	466
Cuba Railroad	1,265
Hershey Cuban Railway	148
Guantanamo Western	147
Chaparra Railway	130
Ferrocarril de Caibarien a Moron	84
Ferrocarril de Tunas	65
Guantanamo Railroad	58

Eleven other railway companies in Cuba are considered by the National Transportation Commission to be public-service lines, and as such required to submit annual reports to that commission. The main-line trackage of these 11 companies amounts to 265 kilometers, with an additional 17 kilometers of yard and switch trackage, a total of 281 kilometers. These roads, together with the main-line trackage operated by each, are as follows:

	Kilometers
Ferrocarril de Gibara y Holguin	48
Ferrocarril Covadonga	38
Compania Ferrocarril de Resulta	35
Ferrocarril Central Nazabal	31
Ferrocarril Perseverancia	25
Ferrocarril de Yaguajay	22
Ferrocarril de Damuji	17
Ferrocarril Central de Matanzas	15
Ferrocarril de Toledo a San Pedro	14
Ferrocarril del Central Portugalete	14
Hershey Terminal Railway	6

The relative importance of these two groups, only the first of which is dealt with in detail in this report (see appendices B and C for others), is further illustrated in table 2, which is based on operations during the fiscal year ending June 30, 1944.

The sugar-mill railroads are as important to the economy of Cuba as are the public-service railroads. They carry a large part of the cane to the mills and take manufactured sugar and molasses, as well as a considerable quantity of refined sugar and alcohol, out of the mills and the mill-operated distilleries. Also, since much of the sugar area of Cuba has no adequate transportation except over these privately operated railways, they handle all requirements of the mills, including coal, fuel oil, machinery and supplies, as well as the needs of many of the villages in the cane districts, transporting every type of commodity required for the life of these communities. Unfortunately no break-down by classes of commodity carried by sugar-mill railroads is available, but practically every type of commodity handled by the public-service railways is handled also by the mills' lines.

The overwhelming part of the freight carried both by public-service and mill lines is, of course, sugar cane and its products. A 5,000,000-ton sugar crop means the handling of 35,000,000 tons of cane, and about 28,000,000 tons of this, plus the 5,000,000 tons of raw sugar as well as molasses, alcohol, refined sugar, and so on (see appendix D), are handled by one or the other type of railroad—in some cases by both.

The public-service railways operate a total of 16,892 cars of all classes, while the sugar mills operate 32,595. Public-service roads operate 611 locomotives of all types, while the sugar mills operate 791.

TABLE 2.—*Operations of Railroads in Cuba, Fiscal Year Ending June 30, 1944*

Type	Group I (9 principal) railroads)	Group II (All others)	Total	Group I operations as percentage of total
Freight-ton kilometers	1,752,000,000	19,505,000	1,771,505,000	98.3
Freight-train kilometers	6,096,000	115,500	6,211,500	91.8
Passengers carried	13,408,000	720,000	14,128,000	94.9
Passenger-train kilometers	10,496,000	364,000	10,860,000	96.7

Digitized by Google

Table 3 shows the rolling stock operated by public carriers.

TABLE 3.—*Rolling Stock of Public Carriers*

Item	9 principal railroads		Other railroads		Total number
	Number	Average motive power or capacity	Number	Average motive power or capacity	
Steam locomotives:		*Pounds*		*Pounds*	
Passenger	112	22,078.0	2	44,374.0	114
Freight	447	26,651.0	26	10,006.0	473
Electric locomotives	24	21,617.0	..	.....	24
		Passengers		*Passengers*	
Passenger cars	283	61.0	14	40.0	297
Baggage cars	141	....	3	....	144
Motor-rail cars	169	46.0	22	25.0	291
Trailers	34	59.0	1	24.0	35
		Tons		*Tons*	
Boxcars	5,945	25.3	71	12.9	6,016
Gondolas	1,040	28.6	8	15.0	1,048
Flat cars	5,235	25.4	33	15.2	5,268
Tank cars	295	38.8	149	20.0	444
Miscellaneous cars	2,375	....	78	....	2,453
Work equipment [1]	889	....	3	....	892
Refrigerator cars [2]	4	30.0	..	....	4

Street railways	
Motor-rail cars	3
Trolley cars	549
Electric locomotives	4
Boxcars	2
Power-line cars	2
Parlor cars	1
Reel-car trailers	1
Tank cars	2
Gondolas	3
Side-dump car trailers	31
Flat-car trailers	22

[1] Includes coaches for officials and paymasters (64), camp cars (483), ballast cars (110), tilt carts (63), excavators, ditchers, and shovels (19), cranes and pile drivers (33), and others (120).
[2] All owned by the Cuba Railroad Company.

Table 4 presents statistics showing break-down of the traffic handled by Cuba's public-service railways.

TABLE 4.—*Freight Carried by Public-Service Railways During Year Ending June 30, 1944*
[In metric tons]

Item	Originating on own line	Received from others	Total
	9 principal railroads		
Cane and products	17,805,343	1,140,410	18,945,753
Agricultural products	416,404	309,569	725,973
Animals and products	176,075	71,744	247,973
Forestry products	622,794	218,562	841,356
Mineral products	1,187,472	340,804	1,528,276
Manufactured goods	919,354	621,077	1,540,431
Miscellaneous	412,149	178,668	590,817
Total	21,539,591	2,880,834	24,420,425
	Other railroads		
Cane and products	1,387,560	726,308	2,113,868
Agricultural products	5,456	16,167	21,623
Animals and products	2,017	1,473	3,490
Forestry products	26,586	7,775	34,361
Mineral products	121,879	61,743	183,621
Manufactured goods	79,933	79,783	159,716
Miscellaneous	290	5,147	5,437
Total	1,623,720	898,396	2,522,116
	All public-carrier railroads		
Cane and products	19,192,903	1,866,718	21,059,621
Agricultural products	421,860	325,736	747,596
Animals and products	178,092	73,217	251,309
Forestry products	649,380	226,337	875,717
Mineral products	1,309,350	402,547	1,711,897
Manufactured goods	999,287	700,860	1,700,147
Miscellaneous	412,439	183,815	596,254
Total	23,163,311	3,779,230	26,942,541

The organization of railroad companies and the construction of railroads in Cuba are fundamentally governed by Military Order Number 34, Series of 1902, which contains, among others, provisions to the effect that "neither the State, the Province or Municipality shall have any expectant interest in the property of such Railroad Corporations" and also that "foreign capital employed in the construction, maintenance or operation of railroads and in loans contracted for such purposes shall be under the protection of the Government of the Island of Cuba and shall be exempt from reprisals, confiscation, and attachments in time of war."

Following is a list of all public-carrier railroads and street-railway systems in Cuba, showing the date of organization, the laws under which they are organized, addresses, and principal officers:

PUBLIC-CARRIER RAILROADS

United Railways of Havana and Regla Warehouses, Ltd. (Ferrocarriles Unidos de la Habana y Almacenes de Regla, Ltda.)
Organized under the laws of England on February 8, 1898.
Home address: The Warren, Virginia Water Surrey, England.
Local address: Estacion Central, Habana.
President: Arthur C. Hunt, London.
Manager: F. A. Davis, Habana.

Havana Terminal Railroad Company. (Not an operating company; its properties are worked by United Railways.)
Organized under the laws of Maine, July 1, 1910.
Home address: 17 Battery Place, New York, N. Y.
Local address: Estación Central, Habana.
President: Walter E. Ogilvie, New York, N. Y.
Manager: F. A. Davis, Habana.

Cuba Railroad Company (Compania del Ferrocarril de Cuba)
Organized under the laws of New Jersey on May 1, 1902.
Home address: Camaguey, Cuba.
Local address: Edificio Bacardi, Habana.
President: Wilfred J. Brown, New York, N. Y.
Manager: Gustavo Pellion Acosta, Camaguey.

Cuba Northern Railways Company (Ferrocarriles del Norte de Cuba)
Organized under the laws of Cuba on May 1, 1918.
Home address: Camaguey, Cuba.
Local address: Edificio Bacardi, Habana.
President: George Murnane, New York, N. Y.
Manager: Gustavo Pellon Acosta, Camaguey.

Ferrocarril de Caibarien a Moron
Organized under the laws of Cuba on February 26, 1911.
Home address: Central Narcisa, Cuba.
Local address: Cuba 355, Habana.
President: Albert C. Fowler, Habana.
Manager: Ernest Fowler, Habana.

Guantanamo & Western Railroad Company (Ferrocarril Guantanamo y Occidente)
Organized under the laws of Maine on September 25, 1909.
Home address: Guantanamo, Cuba.
Local address: 310 Bank of Boston Building, Habana.
President: Francisco Bartes, Habana.
Manager: Ernesto Lefranc, Guantanamo.

Ferrocarril de Guantanamo
Organized in Cuba under the laws of Spain on April 16, 1857.
Home address: Guantanamo, Cuba.
Local address: —— ——
President: William G. Crosbie.
Manager: James B. Gaylord, Guantanamo.

Ferrocarril Cubano de Hershey (Hershey Cuban Railway Company)
Organized under the laws of Cuba on March 25, 1916.
Home address: Central Hershey.
Local address: Manzana de Gomez 541, Habana.
President: P. A. Staples, Central Hershey.

Digitized by Google

Manager: P. A. Staples, Central Hershey.

Chaparra Railroad Company

Organized under the laws of New Jersey on October 14, 1910.
Home address: 120 Wall St., New York, N. Y.
Local address: Chaparra, Oriente.
President: Davis M. Keiser, New York, N. Y.
Manager: Ralph B. Wood, Chaparra.

Ferrocarril de Tunas

Organized under the laws of Cuba on February 3, 1920.
Home address: Manati, Oriente.
Local address: Edificio Metropolitana, Habana.
President: Salvador Rionda y de la Torreitne.
Manager: Salvador Rionda.

Hershey Terminal Railroad

Organized under the laws of Cuba on July 3, 1922.
Home address: Central Hershey.
Local address: Manzana de Gomez 541, Habana.
President: P. A. Staples, Central Hershey.
Manager: P. A. Staples, Central Hershey.

Ferrocarril de Gibara y Holguin

Organized in Cuba under the laws of Spain on December 24, 1884.
Home address: Gibara, Oriente.
Local address: —— ——
President: Pablo Beola Tauler.
Manager: Ricardo Perez Fuentes, Gibara.

Ferrocarril de Covadonga

Organized under the laws of Cuba on June 15, 1923.
Home address: Central Covadonga, Las Villas.
Local address: —— ——
President: Pablo F. Carreno, Central Covadonga.
Manager: Pablo F. Carreno, Central Covadonga.

Compania de Ferrocarriles del Damuji, S. A.

Organized under the laws of Cuba on June 25, 1928.
Home address: Cienfuegos.
Local address: —— ——
President: Pedro Monasterio Alonso, Cienfuegos.
Manager: Fernando Fernandez Mones, Cienfuegos.

Ferrocarril de Yaguajay

Organized under the laws of Cuba on May 19, 1928.
Home address: Yaguajay, Cuba.
Local address: Santo Tomas 152, Habana.
President: Jose Antonio Martinez y Nodarse.
Manager: Maximo Verdura y Battle, Yaguajay.

Ferrocarril Persverancia

Organized under the laws of Cuba on June 8, 1912.
Home address: Central Perseverancia.
Local address: Edificio Metropolitana, Habana.
President: Edward G. Miller, Habana.
Manager: Arturo Menendez Solis, Central Perseverancia.

Ferrocarril de Resulta

Organized under the laws of Cuba on July 20, 1923.
Home address: Central Rensulta, Sagua la Grande.
Local address: —— ——
President: Jorge de Ona y Ribot.
Manager: Jose Luis Pujol.

Ferrocarril de Toledo a San Pedro

Organized under the laws of Cuba on May 31, 1915.
Home address: Central Toledo, Marianao.
Local address: Mercaderes 113, Habana.
President: Manual Aspuru y San Pedro, Habana.
Manager: Eugenio Aspuru.

Ferrocarril Central de Matanzas, S. A.

Organized under the laws of Cuba on December 9, 1937.
Home address: Matanzas, Cuba.
Local address: Mercaderes 113, Habana.
President: Frederick A. Davis, Habana.
Manager: F. A. Davis, Habana.

Ferrocarril Central Portugalete

Organized under the laws of Cuba on August 17, 1912.
Home address: Central Portugalete, Palmira.
Local address: —— ——
President: Mamerto Luzarraga.
Manager: Placido d. Alvare.

Ferrocarril del Central Nazabal

Organized under the laws of Cuba on January 15, 1932.
Home address: Central Nazabal.
Local address: —— ——
President: —— ——
Manager: Jose Aranalde.

STREET RAILWAYS

Havana Electric Railways and Insular Railway Company

Organized under the laws of New Jersey on July 2, 1902.
Home address: Avenida Simon Bolivar 67, Habana.
Local address: Avenida Simon Bolivar 67, Habana.
President: Frank Steinhart, Jr., Habana.
Manager: Salvador Soler, Habana.

Cienfuegos, Palmira and Cruces Electric Railway and Power Company

Organized under the laws of Maine on September 2, 1903.
Home address: Cienfuegos.
Local address: —— ——
President: —— ——
Manager: Ingeniero F. M. Otero.

Table 5 shows the public-service railroads operating in each province, together with the total length of track operated by the sugar mills and a statement of the number of inhabitants of each province per kilometer of railroad, as well as the kilometers of railroad per square kilometer.

To furnish part of the funds for the operation of the National Transportation Commission, public-service railroads are assessed annually $25,000 on the basis of their profits and an additional $25,000 on the basis of kilometers of track operated. The remaining $70,000 of the Commission's $120,000 annual budget is appropriated by the Cuban Government. In the fiscal year 1943–44 only 17 railroads were considered by the Commission to have earned profits, and the assessment against profits of each is shown in the following tabulation:

	Assessment against profits
Cuba Railroad Company	$13,212.07
Cuba Northern Railways Company	3,565.74
United Railways of Habana	5,070.43
Hershey Cuban Railway	999.27
Ferrocarril de Tunas	473.71
Hershey Terminal Railroad	456.35
Chaparra Railroad Company	389.43
Guantanamo-Western	323.98
Ferrocarril Central de Mantanzas	305.02
Ferrocarril de Caibarien a Moron	55.52
Ferrocarril de Gibara y Holguin	39.92
Ferrocarril de Perseverancia	29.66
Ferrocarril de Toledo a San Pedro	26.07
Ferrocarril de Resulta	19.95
Ferrocarril de Nazabal	1.96
Cienfuegos, Palmira and Cruces Electric Railway and Power Co.	.56
Ferrocarril de Portugalete	.36
Total	$25,000.00

There is in Cuba no railroad-equipment industry although one private company is prepared to assemble in Cuba railway freight cars from imported components. This company imports wheels, axles, brake equipment, steel shapes—in fact, everything required with the exception of wood for bodies, which is obtained locally. The local company has not assembled a railway car in 15 years. It now has inquiries for more than 100 cars, but finds it impossible to obtain the necessary materials from the United States.

Railway-car shops do not build complete units but are, in the case of the larger railroads, well equipped to effect repairs on locomotives and other rolling stock. They are dependent en-

TABLE 5.—*Railroad Trackage Data*

Provinces and companies	Kilometers of track	Inhabitants per kilometer of track	Kilometer of track per sq. kilometer
Pinar del Rio			
United Railways	208.986		
Sugar mill railroads [1]	357.000		
Total	565.986	704	0.0419
Habana			
United Railways	453.327		
Hershey Cuban Railway	117.240		
Ferrocarril de Toledo a San Pedro	14.000		
Hershey Terminal	5.810		
Sugar Mills [1]	820.840		
Total	1,411.217	876	.1716
Matanzas			
United Railways	695.548		
Hershey Cuban Railway	30.920		
Ferrocarril Central de Mantanzas	14.830		
Sugar Mills [1]	1,026.000		
Total	1,767.298	204	.2093
Las Villas			
United Railways	865.568		
Cuba Railroad	253.567		
Cuba Northern Railways	107.202		
Ferrocarril de Caibarien a Moron	83.727		
Ferrocarril Covadonga	37.678		
Ferrocarril de Resulta	34.940		
Ferrocarril de Nazabal	31.481		
Ferrocarril Perseverancia	25.342		
Ferrocarril de Yaguajay	21.980		
Ferrocarril del Damuji	17.000		
Ferrocarril del Central Portugalete	13.640		
Sugar Mills [1]	2,384.419		
Total	3,875.544	242	.1810
Camaguey			
Cuba Railroad	452.777		
Cuba Northern Railways	358.382		
Sugar Mills [1]	2,830.000		
Total	2,641.159	134	.1395
Oriente			
Cuba Railroad	559.896		
Guantanamo-Western	147.464		
Chaparra	129.687		
Guantanamo Railroad	57.896		
Ferrocarril de Tunas	65.329		
Ferrocarril de Gibara y Holguin	47.728		
Sugar Mills [1]	3,469.313		
Total	4,477.313	302	.1215
Grand Total	15,738.517	304	.1374

[1] Other than those in public-carrier service.

Digitized by Google

tirely on imported material except in the case of wood.

There are no pipe lines in Cuba.

There is only one aerial cable line. This is operated by the Matahambre Mining Company and is 6 miles long. It starts at the concentrating plant of Matahambre and conveys ore to loading point at the port of Santa Lucia, in Pinar del Rio Province.

The Street Railways of Cuba

Only five cities in Cuba have street railways. These are Habana, Camaguey, Santiago, Matanzas, and Cienfuegos (see appendix A). The total route mileage of track operated in these five cities is as follows:

	Miles
Habana (and Marianao)	61.7
Camaguey	8.6
Santiago de Cuba	10.2
Matanzas	9.0
Cienfuegos	5.3

Four companies operate these routes. The principal one is the Havana Electric Railway Company, which owns and operates the tramway systems in Habana (and through its subsidiary, the Insular Railway Company, the tramways in Marianao,) Camaguey, and Santiago, with a total of 80.5 route miles of the total Cuban trackage.

The number of cars operated by the four companies is 610, of which the Havana Electric Railway Company operated 596. Employees of the four companies number 4,320, of which Havana Electric employs 4,102.

The American Foreign Power Company, with headquarters in New York, controls Havana Electric Utilities, a Florida corporation. This company in turn controls the Compania Cubana de Electricidad, the Insular Real Estate Company, and Havana Electric Railways.

The American Foreign Power Company purchased Habana Electric utilities from the Havana Electric Railway Light and Power Company, a Cuban-United States owned corporation operating the light, power, and electric railways in Habana.

Under Havana Electric Railways two entities operate: (a) Havana Electric Railways, which operates the streetcar lines in Habana, Camaguey, and Santiago, and (b) Insular Railway Company, which operates the tramway system in Marianao. These subsidiary companies are incorporated in the United States.

CONSOLIDATED RAILROADS OF CUBA *(Ferrocarriles Consolidados de Cuba)*.—The Consolidated Railroads of Cuba is a holding company incorporated under the laws of Cuba, July 28, 1924. Thereafter it acquired all of the capital stock of the Cuba Railroad Company, 139,835 shares of the 140,000 shares of common stock of the Cuba Northern Railways Company, all of the common capital stock of the Camaguey and Nuevitas Railway, and all of the common capital stock of the Espirituano Railroad.

This entire group of four railroads is now operated as two companies known as the Cuba Railroad Company and the Cuba Northern Railways Company under the direct management of the Consolidated Railroads of Cuba.

The Consolidated Railroads system operates 1,731 kilometers of single mainline track.

Detailed statements of the mileage of main-line and branches are given below:

The Cuba Railroad Company (Cia del Ferrocarril de Cuba)
Mileage on June 30, 1944

	Kilometers
Main Line—Santa Clara to Santiago	573
Marti-Bayamo—San Luis Line	227
Santa Cruz branch	98
Trinidad branch	91
Nuevitas (Pastelillo) branch	78
Sancti Spiritus branch	53
Manzanillo branch	52
Antilla (Nipe Bay) branch	50
Ponupo branch	18
Holguin branch	18
Zambrana branch	4
Minero branch	3
Buena Vista branch	1
	1,266
Side tracks and spurs (excluding private tracks)	242
Total	1,508

Cuba Northern Railways Company (Ferrocarril de Norte de Cuba)
Mileage on June 30, 1944

	Kilometers
Main Line—Santa Clara to Puerto Tarafa	330
Moron to Jucaro line	60
Florida branch	42
Cunagua branch	19
San Fernando branch	8
Bufadero branch	3
Cienfuegos branch	1
Ibarra branch	3
	466
Side tracks and spurs (excluding private tracks)	132
Total	598

Permanent way and structures.—The lines are standard gage throughout. On the Santa Clara-Santiago main line the maximum curvature is 3° 45′ metric (6° 00′ U. S.) except in the eastern portion, where the maximum curvature is 6° 56′ metric (10° 35′ U. S.). The maximum grades in the eastern portion of this line are 1.86 percent (compensated) eastbound and 2.21 percent (compensated) westbound.

The 933 bridges on the system, having a total length of 69,243 feet, are of the following constructions: wood, 684, steel and wood, 35, steel, 210, and concrete, 4. The system's one tunnel is located on the Trinidad branch at kilometer 84.518. It is 80 feet long and is primarily a support from overhead highway crossing.

Main lines of Cuba Railroad Company are laid with 75- and 80-pound rail, those of the Cuba Northern with 60-, 75-, and 80-pound rail. Ballast is principally disintegrated granite, slate quarry, serpentine stone, and crushed stone. Cross ties are made of hardwood spaced 1,800 to the kilometer on main track and 1,600 to the kilometer on the branch lines and sidings. The total number of cross ties and bridge ties in the system is estimated to be 3,727,100. There are no automatic electric signals, all train order signals being manually operated.

Facilities.—A modern passenger-car repair shop, together with a wood mill, and, a fairly modern freight-car repair shop are located at Camaguey. General repair shops are located at Camaguey and Moron and are ample for present locomotive-repair requirements, including roundhouse at Moron. Locomotive and car repairs are made in the shop at Santiago de Cuba. A locomotive-repair shop and roundhouse with capacity for two locomotives are operated at Santa Clara.

Equipment.—Tables 6 and 7 present equipment data as furnished by the railroad.

Traffic (1944). — Cuba Northern Railways Company carried a total of 2,551,707 metric tons of freight, of which 2,220,902 metric tons originated on its own lines. This total was made up of the following classes of goods:

	Metric tons
Sugarcane and its products	2,270,144
Other agricultural products	58,621
Animals and products	5,621
Forestry products	62,787
Mineral products	39,208
Manufactured goods	65,168
Miscellaneous	50,269
Total	2,551,707

Cuba Railroad Company in the same period carried a total of 6,978,876 metric tons of freight of which 6,221,420 originated on its own lines. The make-up of this freight was as follows:

	Metric tons
Sugarcane and its products	4,816,643
Agricultural products	259,170
Animals and products	121,340
Forestry products	299,845
Mineral products	793,850
Manufactured goods	453,517
Miscellaneous	234,511
Total	6,978,876

Financial and other data.—The Cuba Northern reported average freight income per ton-kilometer of $0.0187. The Cuba Railroad Company reported average freight income per ton-kilometer of $0.0131.

Revenue passengers carried by Cuba Northern numbered 1,360,967, and by Cuba Railroad, 4,181,997.

For the year ending June 30, 1944, income per passenger-kilometer for Cuba Northern amounted to $0.0111; and for Cuba Railroad, $0.0102.

Operating revenue of Cuba Northern totaled $3,075,770; and of Cuba Railroad, $12,936,139.

Total operating expenses of Cuba Northern were $2,343,310; and of Cuba Railroad, $8,119,840.

Digitized by Google

TABLE 6.—*Cuba Northern Railways—Rolling Stock and Work Equipment*

Item	Total number owned and leased	Motive power or capacity: Total for all units	Motive power or capacity: Per unit
Locomotives			
Steam locomotives:		*Pounds*	*Pounds*
For freight trains	22	699,823	31,810
For passenger trains	9	226,044	25,116
For yard service	3	74,358	24,786
Total steam locomotives	34	1,000,225	29,418
Cars			
		Tons	*Tons*
Boxcars	1,060	37,220	35.1
Flat cars	220	6,750	30.7
Gondolas	110	3,650	31.5
Tilt carts	22	938	42.6
Cattle cages	10	300	30.0
Tank cars	77	3,580	46.5
Total freight cars	1,505	52,438	34.8
Cabooses	34	1,020	30.0
Total cars in freight service	1,539	53,458	34.7
Coaches			
		Passengers	*Passengers*
1st-class coaches	5	312	62.4
2nd-class coaches	18	1,156	64.2
Pullman coaches	1	29	29.0
Total passenger coaches	24	1,497	62.4
Baggage, express and mail cars	14		
Total coaches and cars in passenger service	38		
Motor coaches			
		Passengers	*Passengers*
Passenger motor coaches (internal combustion)	10	459	45.9
Tow coaches	2	125	62.5
Total passenger coaches	12	584	48.7
Work equipment			
Coaches for officials and paymasters	2		
Camp cars	87		
Tilt carts (for servicing the company)	24		
Excavators, ditchers, and shovels	8		
Cranes and pile drivers	4		
Other work equipment	6		
Total work equipment in the company service	81		

TABLE 7.—*Cuba Railroad Company—Rolling Stock and Work Equipment*

Item	Total number owned and leased	Motive power or capacity: Total for all units	Motive power or capacity: Per unit
Locomotives			
Steam locomotives:		*Pounds*	*Pounds*
For freight trains	71	2,255,940	31,774
For passenger trains	30	801,475	26,716
For yard service	3	71,400	23,800
Total steam locomotives	104	3,128,815	30,085
Cars			
		Tons	*Tons*
Boxcars	1,015	36,680	38.1
Flat cars	322	9,660	30.0
Gondolas	99	2,970	30.0
Tilt carts	24	1,060	44.2
Cattle cages	134	4,270	31.9
Tank cars	85	4,055	47.7
Refrigerated cars	4	120	30.0
Total freight cars	1,683	60,815	36.1
Cabooses	21	630	30.0
Total cars in freight service	1,704	61,445	66.1
Coaches			
		Passengers	*Passengers*
1st-class coaches	26	1,736	66.8
2nd-class coaches	21	1,256	59.8
Salon coaches	2	60	30.0
Pullman coaches	15	1,007	67.1
Baggage, express and mail cars	27	.....	....
Total coaches and cars in passenger service	91	4,059	63.4
Motor coaches			
		Passengers	*Passengers*
Passenger motor coaches (internal combustion)	22	963	43.8
Tow coaches	9	545	60.6
Total passenger coaches	31	1,508	48.6
Work equipment			
Coaches for officials and paymasters	3		
Camp cars	136		
Tilt carts (for servicing the company)	28		
Excavators, ditchers, and shovels	3		
Cranes and pile drivers	6		
Other work equipment	21		
Total work equipment in the company service	197		

For the year ending June 30, 1944, Cuba Northern employed 1,146 persons; and Cuba Railroad Company, 4,847 persons.

UNITED RAILWAYS OF THE HAVANA AND REGLA WAREHOUSES, LIMITED *(Ferrocarriles Unidos de la Habana y Almacenes de Regla, Ltda.)*—This British company operates 2,223 kilometers of first-line track. All lines originate at Habana. One operates to Guane in Pinar del Rio Province, one to Cienfuegos, one to Matanzas, while branch lines join Cardenas, Antonrecio, Esperanza, Concha Isabela, and various other points in western and central Cuba.

The company operates 93 kilometers of main and branch line electrified track, which is operated on 600 volt DC. Construction is partly direct suspension and partly catenary trolley with negative grounded to rails.

Permanent way and structures.—The line is standard 4′ 8½″ gage, except for three short narrow-gage lines operating out of Zulueta, Cruces, and Juragua. Most of the track is laid with 80-pound rail although some 100-pound is laid between Cambute and Bainoa, and also between Santo Domingo and Santa Clara. Branch-line rails are 60 and 80 pounds. Cross ties are principally of native hardwood although a small quantity of creosoted pine has been used. Ballast is of crushed stone gravel and earth according to local availability. There are no tunnels on the system but there are 434 bridges and culverts more than 26.25 feet in length, all constructed of steel and masonry or of masonry. Only 13.8 kilometers are equipped with automatic signaling devices. These are standard-type block signals of American and German make operated on AC 60-cycle track circuits.

Facilities.—Main work shops are located at Cienaga on the outskirts of Habana. They are equipped to handle heavy repairs to all standard-gage locomotives. Work shops comprise electrical shop, boiler and tender shop, blacksmith shop, tinsmith shop, carpenter and pattern shop, foundry, airbrake room, tool room, and electrical shop. The power plant located at Habana station is equipped with three 400-ampere motor generator sets.

In addition, the main repair shop of the old Cuban Central Railway (now merged with United), located at Sagua la Grande, handles general repairs to narrow-gage locomotives. The 20-stall roundhouse is built two-thirds of the way around a 70-foot turntable.

The principal work shops for the maintenance of rolling stock are located at Luyano near Habana and consist of coach-repair, steel-car, coach-painting, tinsmith, airbrake, and machine shops. The coach-repair shop has five tracks each with accommodations for six coaches. The other shops are adequate to care for any-

Digitized by Google

TABLE 8.—*United Railways of the Havana—Rolling Stock and Work Equipment*

Item	Total number owned and leased	Motive power or capacity: Total for all units	Motive power or capacity: Per unit
Locomotives			
Steam locomotives:		*Pounds*	*Pounds*
For freight trains	257	6,631,991	25,805
For passenger trains	57	1,085,133	19,037
For yard service	37	873,516	23,608
Total steam locomotives	351	8,590,640	21,475
Electric locomotives for freight trains	13	274,443	21,110
Total locomotives	364	8,865,083	24,355
Cars			
		Tons	*Tons*
Boxcars	3,309	97,275	29.48
Flat cars	4,474	110,087	24.61
Gondolas	673	18,850	28.01
Cattle cages	103	3,015	29.27
Tank cars	40	866	21.65
Cane cages	208	3,036	14.60
Total freight cars	8,798	233,129	26.50
Cabooses	261	7,519	28.81
Total cars in freight service	9,059	240,648	26.56
Coaches			
		Passengers	*Passengers*
1st-class coaches	45	3,044	67.64
2nd-class coaches	80	5,145	64.31
1st- and 2nd-class combined	28	1,489	53.18
Salon coaches	4	100	25.00
Pullman coaches	6	144	24.00
Total passenger coaches	163	9,922	60.87
Baggage, express, and mail cars	87	1,652	18.99
Total coaches and cars in passenger service	250	11,574	
Motor coaches			
		Passengers	*Passengers*
Total motor coaches	101	5,252	52.00
Work equipment			
Coaches for officials and paymasters	1		
Camp cars	293		
Ballast cars	109		
Tilt carts (for servicing the company)	7		
Excavators, ditchers, and shovels	5		
Cranes and pile drivers	12		
Other work equipment	62		
Total work equipment in the company service	489		

thing turned out of the coach-repair shops.

At Caibarien there is a car-repair shop for narrow-gage equipment, being a small annex to the locomotive shop.

Equipment.—Table 8 shows rolling stock and work equipment as of June 30, 1944.

Miscellaneous data.—Table 9 shows the amount of freight carried during the year ending June 30, 1944. Other data are given in the succeeding itemizations.

TABLE 9.—*United Railways of the Havana—Freight Carried*

[In metric tons]

Item	Originating on this line	Received from other lines	Total
Cane and its products	8,402,959	578,695	8,981,654
Agricultural products	156,605	198,995	355,600
Animals and products	51,156	65,691	116,847
Forestry products	272,237	166,045	438,282
Mineral products	354,846	189,097	543,943
Manufactured goods	623,866	238,103	861,969
Miscellaneous	215,212	28,960	244,172
Total	10,076,881	1,465,586	11,542,467

Freight income per ton-kilometer: $0.01315.

Revenue passengers carried: 4,448,808.

Average passenger fare per passenger-kilometer: $0.00935.

Total income for the year ending June 30, 1944: $14,664,140.24.

Total expenses: $12,597,940.91.

Capitalization—

Capital stock authorized: $53,532,900.00.

Capital stock issued: $51,847,717.03.

Outstanding: 23,166,975 pounds sterling.

Employees (year ending June 30, 1944): 7,981.

HERSHEY CUBAN RAILWAY—*(Ferrocarril Cubano de Hershey).*—This United States (privately owned) company operates 149 kilometers of main-line track as follows:

Matanzas—Enlace Molina	87
San Mateo—San Antonio	27
Enlace Barneo—Boniva	1
Jibacoa—Santa Cruz del Norte	7
Molina—Cojimar	4
Hershey—Maralen	23
Total kilometers in operation	149

In addition there are 28 kilometers of auxiliary track. All of the track is electrified.

Permanent way and structures.—The road is standard gage throughout. Cuban hardwood ties and rock ballast are used. All main-line rails are 85 pound while switch and siding rails are 60 pound. There are no tunnels on this line. All signals are hand-operated semaphores, which were purchased secondhand. Three were installed when the lines were constructed in the 1920's, and two were added in 1933.

Facilities.—Roundhouses, located at Central Hershey, are adequate to handle present equipment. Also at Central Hershey are a storage tank for 600,000 gallons of fuel oil and complete repair facilities. The principal yard is at Central Hershey.

Equipment.—Table 10 shows the rolling stock and work equipment as of June 30, 1944.

TABLE 10.—*Hershey Cuban Railway—Rolling Stock and Work Equipment*

Item	Total number owned and leased	Motive power or capacity: Total for all units	Motive power or capacity: Per unit
Locomotives			
		Pounds	*Pounds*
Steam locomotives for freight trains	7	147,077	21,011
Electric locomotives for freight trains	11	220,000	20,000
Total locomotives:	18	367,077	20,000
Cars			
		Tons	*Tons*
Boxcars	146	4,380	30
Flat cars	46	1,380	30
Gondolas	107	3,210	30
Cattle cages	4	120	30
Cane cages	488	12,660	26
Tank cars	10	450	45
Other cars in freight service	7	210	30
Total freight cars	808	22,410	
Cabooses	5		
Total cars in freight service	813		
Coaches			
Baggage, express, and mail cars	4		
Motor coaches			
		Passengers	*Passengers*
Passenger motor coaches (electric)	17	796	47
Tow coaches	5	250	50
Total passenger coaches	22	1,046	48
Work equipment			
Coaches for officials and paymasters	9		
Camp cars	10		
Excavators, ditchers, and shovels	1		
Cranes and pile drivers	4		
Other work equipment in the company service	[1] 2		
Total work equipment in the company service	26		

[1] One hospital car, one first-aid car.

Digitized by Google

Miscellaneous data.—Table 11 shows the amount of freight carried during the year ending June 30, 1944. Other data are given in the succeeding itemizations.

TABLE 11.—*Hershey Cuban Railway—Freight Carried*
[In meter tons]

Item	Originating on this line	Received from other lines	Total
Cane and its products	1,073,083	74,756	1,147,839
Agricultural products	6,032	11,746	17,778
Animals and products	946	1,730	2,676
Forestry products	1,823	5,019	6,842
Mineral products	9,954	39,106	49,060
Manufactured goods	41,253	52,386	93,639
Total	1,133,091	184,743	1,317,834

Average freight rate per ton-kilometer: $0.02774.

Passengers carried: 927,600.

Average passenger fare per passenger-kilometer: $0.00946.

Operating revenue for year ending June 30, 1944: $1,130,775.05.

Operating and other expenses: $930,905.32.

Capitalization: Authorized, $10,000,000; issued, $6,647,600.

Employees (year ending June 30, 1944: 688.

Guantanamo-Western Railroad Company

This United States (privately owned) company operates 147 kilometers of first track. The main line runs from Boqueron north and west to San Luis, where it joins the Cuba Railroad. There are small branch lines from kilometer 51 to the town of La Lima 8 kilometers northwest; from kilometer 23 northeast to San Antonio, kilometer 25; and 13 kilometers from kilometer 23 to kilometer 36, northeast to Esperanza.

Permanent way and structures.—This railroad is single track, standard 4′ 8½″ gage. Ties are of native hardwood and the main line between Boqueron and San Luis is laid with 80-pound rail. The main line from Boqueron to kilometer 88.4 is ballasted; none of the rest of the line is ballasted. Between Guantanamo and Boqueron there are two 30-foot wooden bridges. Between Guantanamo and San Luis there are 20 bridges. The line has no tunnels. Maximum curvature of main-line track is 6° 34″ metric curve; maximum grade, 2.33 percent; and clearance, 13′ 8½″ between track centers.

Facilities.—Repair shops are located in Guantanamo City (San Justo), where five locomotives can receive heavy repairs simultaneously.

Equipment.—Table 12 shows the rolling stock and work equipment as of June 30, 1944.

TABLE 12.—*Guantanamo-Western Railroad Company—Rolling Stock and Work Equipment*

Item	Total number owned and leased	Motive power or capacity: Total for all units	Motive power or capacity: Per unit
Locomotives			
Steam locomotives:		*Pounds*	*Pounds*
For freight trains	11	323,000	29,363
For passenger trains	0	0	0
For yard service	5	126,390	25,278
Total steam locomotives	16	449,390	28,086
Cars			
		Tons	*Tons*
Boxcars	195	6,630.0	34.0
Flat cars	54	1,698.6	31.4
Gondolas	9	110.5	12.5
Cattle cages	2	60.0	30.0
Cane cages	150	4,108.6	27.4
Tank cars	43	1,382.1	32.1
Total freight cars	453	13,989.8	30.9
Cabooses	8	.....	.....
Total cars in freight service	461	13,989.8	30.9
Coaches			
		Passengers	*Passengers*
1st-class coaches	1	76	76
2nd-class coaches	5	354	71
Total passenger coaches	6	430	72
Baggage, express and mail cars	2		
Total coaches and cars in passenger service	8	430	72
Motor coaches			
Passenger motor coaches:		*Passengers*	*Passengers*
Internal combustion	13	563	43
Electric Diesel	2	52	26
Tow coaches	11	686	62
Total passenger coaches	26	1,301	50
Other towcars in motor service	2		
Total motor and tow coaches in passenger service	28	1,301	50
Work equipment			
Coaches for officials and paymasters	3		
Camp cars	6		
Tilt carts (for servicing the company)	2		
Cranes and pile drivers	4		
Other work equipment	2		
Total work equipment in the company service	17		

Miscellaneous data.—Table 13 shows the amount of freight carried during the year ending June 30, 1944. Other data are given in the succeeding itemizations.

TABLE 13.—*Guantanamo-Western Railroad Company—Freight Carried*
[In metric tons]

Item	Originating on this line	Received from other lines	Total
Cane and its products	512,748	3,283	516,031
Agricultural products	17,748	6,081	23,829
Animals and products	228	650	878
Forestry products	9,231	4,107	13,338
Mineral products	23,647	14,820	38,467
Manufactured goods	10,654	25,256	35,910
Miscellaneous	11,279	21,356	32,635
Total	585,535	75,553	661,088

Freight income per ton-kilometer: $0.024.

Revenue passengers carried: 1,201,160.

Income per passenger-kilometer: $0.02.

Total gross operating income for year ending June 30, 1944: $1,262,319.41.

Total operating expenses: $1,130,298.38.

Capital stock authorized: $2,750,000.

Capital stock issued: $2,750,000.

Employees (year ending June 30, 1944): 785.

GUANTANAMO RAILWAY (*Ferrocarril de Guantanamo*).—This railway is privately owned by Cuban and American capital. The majority of common stock is held by Guantanamo Sugar Company, a New Jersey corporation.

The company operates 58 kilometers of first track. The main line runs north from Caimanera (kilometer 0.0) on the western shore of Guantanamo Bay to Florida (kilometer 42). Branch lines run from Novaliches (kilometer 9) to Los Canos (kilometer 13.4) and from Cuatro Caminos (kilometer 25) to the end of the Limones branch line (kilometer 48). The Maquey branch line reaches from kilometer 29 to kilometer 45.1.

Permanent way and structures.—This line is 4′ 8½″ gage, using mainly 60-pound rail but some 70- and 80-pound. Cross ties are made of Cuban hardwood and ballast is principally earth with small amounts of gravel and rock in some sections. The maximum curvature in the main line is 10° and in branch lines, 15°. The heaviest grade on the main line is 2.8 percent between Guantanamo and Florida, while grades up to 3 percent are found on branch lines. There are 111 bridges but no tunnels. No automatic signaling devices are used.

Facilities.—The roundhouse and repair shop located at Guantanamo can

Digitized by Google

repair and maintain 10 to 15 locomotives and 600 to 800 cars. Facilities include machine shop, boiler shop, blacksmith shop, engine house, carpenter and woodworking shop, materials store house and so on. No foundry is operated; castings are purchased from private foundries. Shop machines are electrically operated. The power is purchased as the company does not operate a power plant. About 80 men are employed in the shops.

Equipment.—Table 14 shows the rolling stock and work equipment as of June 30, 1944.

TABLE 14.—*Guantanamo Railway—Rolling Stock and Work Equipment*

Item	Total number owned and leased	Motive power or capacity: Total for all units	Motive power or capacity: Per unit
Locomotives			
		Pounds	*Pounds*
Steam locomotives:			
For freight trains	4	95,160	23,790
For passenger trains	4	63,820	15,955
Total steam locomotives	8	158,980	19,873
Cars			
		Tons	*Tons*
Boxcars	122	3,300	27
Flat cars	23	460	20
Gondolas	8	160	20
Cane cages	100	2,640	26
Tank cars	29	861	30
Total freight cars	282	7,421	26
Cabooses	3		
Total cars in freight service	285	7,421	26
Coaches			
		Passengers	*Passengers*
1st-class coaches	8	472	59
Work equipment			
Camp cars	1		
Tilt cars (for servicing the company)	2		
Excavators, ditchers, and shovels	1		
Other work equipment	8		
Total work equipment in the company service	12		

Miscellaneous data.—Table 15 shows the amount of freight carried during the year ending June 30, 1944. Other data are given in the succeeding itemizations.

TABLE 15.—*Guantanamo Railway—Freight Carried*

[In metric tons]

Item	Originating on this line	Received from other lines	Total
Cane and its products	340,973	2,196	343,169
Agricultural products	443	1,617	2,060
Animals and products	.....	22	22
Forestry products	3,006	2,288	5,294
Mineral products	18,336	16,657	34,993
Manufactured goods	6,263	6,035	12,298
Total	369,021	28,815	397,836

Freight income per ton-kilometer: $0.03.

Revenue passengers carried: 830,456.

Income per passenger-kilometer: $0.009.

Total revenue for year ending June 30, 1944: $381,784.93.

Total expenses: $422,884.83.

Capital stock authorized, $1,000,000; capital stock issued, $998,900.

Employees (year ending June 30, 1944): 205.

TUNAS RAILWAY *(Ferrocarril de Tunas, S. A.).*—This railway is privately owned by Cuban nationals. The Company operates 65 kilometers of first-line track. The line runs from Puerto Manati to Victoria de las Tunas, where it joins the Cuba Railroad line.

Permanent way and structures.—There are five bridges on the line. The total length of steel bridges is 90.6 meters; wooden bridges with steel support, 32.96 meters; and bridges and culverts of wood, 156.1 meters. Undertrack drainage culverts of galvanized steel and concrete pipe total 106 meters. Track is ballasted with crushed limestone. Cross ties are of Cuban hardwood, and 80-pound rails are used throughout. The steepest grade on the line is 1 percent. No automatic signaling devices are used.

Facilities.—Roundhouse, car-repair shop, and sidings are located at Central Manati, Oriente Province.

Equipment.—Table 16 shows the rolling stock and work equipment as of June 30, 1944.

TABLE 16.—*Tunas Railway—Rolling Stock and Work Equipment*

Item	Total number owned and leased	Motive power or capacity: Total for all units	Motive power or capacity: Per unit
Locomotives			
		Pounds	*Pounds*
Steam locomotives:			
For freight trains	8	200,400	25,050
For yard service	1	.....	.....
Total steam locomotives	9	200,400	25,050
Cars			
		Tons	*Tons*
Boxcars	50	1,500	30.00
Flat cars	68	2,040	30.00
Cane cages	349	10,470	30.00
Tank cars	11	225	20.45
Total freight cars	478	14,235	29.78
Coaches			
		Passengers	*Passengers*
1st- and 2nd-class, combined	3	300	100
Salon coaches	1	20	20
Total passenger coaches	4	320	80
Baggage, express and mail cars	1		
Total coaches and cars in passenger service	5		
Motor coaches			
		Passengers	*Passengers*
Passenger motor coaches (internal combustion)	6	240	40
Work equipment			
Excavators	1		
Other work equipment	19		
Total work equipment in the company service	20		

Miscellaneous data.—Table 17 shows the amount of freight carried during the year ending June 30, 1944. Other data are given in the succeeding itemizations.

TABLE 17.—*Tunas Railway—Freight Carried*

[In metric tons]

Item	Originating on this line	Received from other lines	Total
Cane and its products	525,665	29,949	555,614
Agricultural products	388	397	785
Animals and products	17	.....	17
Forestry products	5,804	828	6,632
Mineral products	26,309	90	26,399
Manufactured goods	2,947	3,410	6,357
Miscellaneous	3,195	1,866	5,061
Total	564,325	36,540	600,865

Digitized by Google

Freight income per ton-kilometer: $0.02252.

Revenue passengers carried: 133,776.

Income per passenger-kilometer: $0.0098.

Total revenue for year ending June 30, 1944: $455,655.80.

Total expenses: $262,620.27.

Capital stock authorized, $1,000,000; capital stock issued, $200,000.

Employees (year ending June 30, 1944): 150.

Chaparra Railroad Company

This company owned by United States interests, operates 130 kilometers of first-line track. The main line extends to the west and south from Velasco, where it connects with the Gibara and Holguin Railroad to the station at Sabanasco on the Cuban Railroad Company. Three of the branches offer public services—(1) from Delicias, south of the Bay of Puerto Padre, to Cayo Juan Claro, the port in the bay; (2) from San Manuel to Puerto Padre; and (3) from Velasquez southwest to Peladeros. This last is known as the Tunas Branch.

Permanent way and structures.—The road is 36-inch gage. There are no grades more than 1.50 percent. The line has five principal bridges located over small rivers at kilometer 1.320, kilometer 20.400, kilometer 30.020, kilometer 77.112, and kilometer 41.140. There are no tunnels or ferries. Rails used are as follows:

	Pounds
Velasco to Chaparra	45
Chaparra to Delicias	50
Vasquez to Sabanasco	60
Cay Juan Clara branch	60
Puerto Padre branch	40 and 45
Vasquez to Peladeros	48
All lines not in public service, serving only the sugar company	48 and 50

Cuban hardwood ties are used, and the ballast is of crushed limestone along most of the track. No automatic signaling devices are used.

Facilities.—At the shops in the town of Chaparra there are 22 siding tracks, a "U" around the rear of the shops, and 2 "Y"s where trains may be reversed.

At the town of Delicias are 31 sidings, 3 "U"s, and 1 "Y."

At the town of Vasquez are seven siding tracks and one alongside the railroad station. Also, there is a "Y."

There are six sidings at the town of Aguado de Vasquez.

At Chaparra there is a two-pit locomotive shop of wood construction suitable for making running repairs. Light running repairs may be made to cars.

At Delicias there is one all-metal locomotive-repair shop, equipped with two 20-ton traveling cranes as well as with both large and small tools for repair in classes 2, 3, 4, and 5. There is a car shop of wood construction. This is equipped with necessary woodworking machinery, one lathe for car wheels and axles, one hydraulic press for pressing wheels on and off of axles, two blacksmith forges, one A. R. R. test rack for triple valves, and all of the equipment necessary to build steel and wooden cars.

At Vasquez there is a locomotive-inspection pit which is equipped with necessary tools for making running repairs to both locomotives and cars.

Equipment.—Table 18 shows the rolling and work equipment of this railway as of June 30, 1944.

TABLE 18.—*Chaparra Railroad Company — Rolling Stock and Work Equipment*

Item	Total number owned and leased	Motive power or capacity: Total for all units	Motive power or capacity: Per unit
Locomotives			
		Pounds	*Pounds*
Steam locomotives for freight trains	4	47,135	11,784
Cars			
		Tons	*Tons*
Boxcars	12	180	15
Flat cars	12	180	15
Cattle cages	12	180	15
Total freight cars	36	540	15
Coaches			
		Passengers	*Passengers*
1st-class coaches	3	162	54
2nd-class coaches	3	162	54
Total passenger coaches	6	324	54
Baggage, express and mail cars	3	45	15
Total coaches and cars in passenger service	9	369	
Work equipment			
Coaches for officials and paymasters (motor)	44		
Cranes and pile drivers	3		
Total work equipment in the company service	47		

Miscellaneous data.—The amount of freight carried by this railway during the year ending June 30, 1944, is shown below. All the freight originated on this line.

	Metric tons
Cane and its products	451
Agricultural products	6,219
Animals and products	178
Forestry products	897
Mineral products	870
Manufactured goods	9,171
Miscellaneous	12,166
Total	29,952

Other pertinent data are itemized here.

Average freight rate per ton-kilometer: $0.0419.

Passengers carried: 246,504.

Average passenger fare per passenger kilometer: $0.0268.

Total revenue for year ending June 30, 1944: $409,493.56.

Total expenses: $250,800.78.

Capitalization: Capital stock authorized, $553,600; capital stock issued, $553,600.

Employees (year ending June 30, 1944): 48.

CAIBARIEN—MORON RAILWAY *(Ferrocarril de Caibarien a Moron).*—This railway, which is privately owned by Cuban nationals, operates 84 kilometers of first track. The line runs between the town of Chambas, Camaguey Province, to Caibarien in Las Villas Province.

Permanent way and structures.—This line has a 27¾" gage and a maximum curvature of 7°. Its grades are insignificant. It has three principal bridges—one steel span bridge 40 meters long over the Jatibonico River, one concrete and steel 20-meter bridge over the Dolores River and one concrete and wooden bridge 15 meters long over the Yaguey River. The road uses 40- to 75-pound rails and Cuban hardwood ties, ballasted with earth and crushed rock. There are no tunnels on the line. No automatic signals are used.

Facilities.—The locomotive-repair shop located at Central Narcisa is wooden with fibre-cement tile roof and floor space of 1,550 square meters. It has four cement pits, 9 x 10 meters each, and a well-equipped machine and tool shop. The company operates no power plant or classification yard.

Equipment.—The following itemization shows the rolling stock of this railway as of June 30, 1944.

	Total owned and leased
Steam locomotives:	
For freight trains	2
For passenger trains	12
For yard service	2
Cars in freight service:	
Boxcars	45
Flat cars	16
Cattle cages	2
Cane cages	400
Tank cars	11
Other cars in freight service	17
Cabooses	2
Coaches and cars in passenger service:	
1st-class coaches	4
2nd-class coaches	3
Pullman coaches	1
Baggage, express, and mail cars	3
Passenger motor coaches (internal combustion)	3

Miscellaneous data.—Table 19 shows the amount of freight carried by this railway as of June 30, 1944. Other data are given in the succeeding itemizations.

Digitized by Google

TABLE 19.—*Caibarien-Moron Railway—Freight Carried*

[In metric tons]

Item	Originating on this line	Received from other lines	Total
Cane and its products	314,208	.....	314,208
Agricultural products	1,916	106	2,022
Animals and products	240	.....	240
Forestry products	7,439	.....	7,439
Mineral products	1,486	.....	1,486
Manufactured goods	2,107	295	2,402
Miscellaneous	11,068	935	12,003
Total	338,464	1,336	339,800

Revenue passengers carried: 77,178.

Average passenger fare per passenger-kilometer $0.00742.

Total revenue for year ending June 30, 1944: $337,613.61.

Total expenses: $344,989.44.

Employees (year ending June 30, 1944): 120. During the sugar-grinding season, this line usually hires 230 temporary employees, all Cubans.

APPENDIX A

Havana Electric Railway Company

This company operates the streetcar systems in Habana, Camaguey, and Santiago. A subsidiary concern, the Insular Railway Company, operates the streetcar system of Marianao. In some cases the figures for the street railways in Habana and Marianao are consolidated. The address of the Havana Electric Railway Company is Simon Bolivar 67, Habana.

Cienfuegos, Palmira and Cruces is privately owned by Cuban nationals. Compania de Tranvias de Matanzas is privately owned by Cuban and Spanish nationals.

TABLE 21.—*Cienfuegos, Palmira and Cruces Electric Railway and Power Co. and Compania de Tranvias de Matanzas—General Statistics*

Item	Cienfuegos, Palmira and Cruces	Compania de Tranvias de Matanzas
Length:		
Single track—miles	5.28	7.67
Double track—miles	....	1.34
Gage	4' 8½"	4' 8½"
Rail poundage	60	60
Current	440 volt DC	600 volt DC
Facilities	n. a.	n. a.
Equipment (cars in operation on December 31, 1944)	3	11
Number of passengers	[1] 335,425	[2] 1,960,056
Operating revenue	[1] $16,816.10	[2] $93,320.35
Operating expense	[1] $16,593.66	[2] $109,985.87
Number of employees	[1] 20	[2] 98

[1] Year ending June 30, 1944.

[2] May 1, 1514 to April 30, 1945.

n. a. Information not available.

TABLE 20.—*Havana Electric Railway Company—General Statistics*

	Length (in miles)	Gage	Rails	Current	Facilities	Equipment (Cars in operation December 31, 1944) [4]	Passengers	Operating revenues	Operating expenses	Employees
Marianao	28 (single-track) 34 (double-track)	4'-8½"	(1)	2 trolley 550 volt DC	(3)	549	146,576,413	$5,675,807.66	$5,706,169.81	3,864
Habana	(5)	4'-8½"	(2)	2 trolley 550 volt DC	(3)	(5)	(5)	(5)	(5)	(5)
Camaguey	9 (single-track)	4'-8½"	(1)	1 trolley 550 volt DC	..	20	4,451,440	181,400.29	155,967.29	157
Santiago	9 (single track) 1 (double-track)	4'-8½"	(2)	1 trolley 550 volt DC	..	27	7,347,586	231,787.12	227,437.86	181

[1] 75-lb. T-rail on ballast; 75-lb. T-rail on concrete base; and canal rail on concrete base.

[2] 89-lb. canal rail in tangents, and 108-lb. and 113-lb. canal rail in curves, on concrete base. 75-lb. T-rail in tangents, and 108-lb. and 113-lb. canal rail in curves, on ballast.

[3] The company has six car-repair yards in Habana at various locations. One is at 18th and Linea Streets in Vedado, with a space for storage of 13 cars and having two repair pits for light repairs to passenger locomotives and heavier repairs to electric locomotives. The other yards are as follows — one at Linea and 20th Streets in Vedado with storage space for 90 cars and with pits for car inspection and light repairs; one at Calle O in Marianao on the Almendares River, with track-storage space for 150 cars and with 16 pits; one at Carlos III. and Montoro Streets, with storage space for 65 cars and with three pits; one at Calzada del Cerro 2124, with storage space for 90 cars and with three pits; one at Diez de Octubre Street No. 1321, with storage space for 220 cars and with 9 pits.

A general repair shop located at 18th and Linea in Vedado can handle 74 cars at a time. It has 15 pits and can handle light and heavy repairs, including electric repairs. The car-paint shop, located on the Almendares River at Calle O, can paint 15 cars at one time. Here woodworking machinery is installed.

[4] The Havana Electric Railway Co. for operations in Habana and Marianao owns 549 trolley cars, each with average seating capacity of 34, average weight of 19,000 pounds, and equipped with single four-wheel trucks 84" wheel base, 30" wheels, two trolleys metallic return, and powered with series wound railway motors for 550 DC volts. Each car has two motors with either G. E. 264-B, hp. 25; G. E. 220-L, hp. 40; or W. H. 323-A, hp. 40. In addition, there are four electric locomotives, weighing 80,000 pounds each, powered with G. E. 550-volt, DC, railway series wound motors. Also two boxcars, two tower-line cars, one reel-car trailer, two 2,500-gallon tank cars, three refuse cars, 31 six-yard dump-car trailers, and 22 flat-car trailers.

Figures on these two companies cover period from June 1, 1944 to May 31, 1945.

[5] Included with Marianao above.

Digitized by Google

APPENDIX B

TABLE 22.—*Statistics of Other Common Carrier Railways in Cuba*

Railroad	Length of single or first track (kilometers)	Total freight carried (metric tons)		Average freight rate per ton-kilometer	Number of passengers carried	Average passenger fare per passenger-kilometer	Number of employees
		Originating on own line	Received from other lines				
Gibara y Holguin RR	48	9,771	.....	$0.06675	140,862	$0.0139	63
Covadonga RR	38	114,858	93,782	.0169	24,360	.021975	67
Resulta RR	35	268,060	.....	.017	29,466	.01451	257
Central Nazabal	31	75,213	.....	....	36,875	.....	22
Perseverancia RR	25	274,065	.....	.01	42,733	.02	53
Yaguajay	22	141,486	.....	...	.....	.....	5
Damuji	17	113,100	.....	.00569	318	.0027	17
Central de Matanzas	15	126,337	550,478	.03	5,370	.01	90
Toledo a San Pedro	14	319,499	.....	...	.....	.....	8
Central Portugalete	14	57,507	.....	...	.....	.....	16
Hershey Terminal	6	123,824	254,136	.06722	440,387	.03181	84
Total	265	1,623,720	898,396	.....	720,371	.....	682

APPENDIX C

TABLE 23.—*Revenues and Expenditures of Other Common Carrier Railways in Cuba*

Railroad	Operating and other revenue	Operating and other expenses
Gibara y Holguin RR	$ 87,928.52	$ 71,659.27
Covadonga RR	70,884.72	78,071.11
Resulta RR	47,715.10	39,586.17
Central Nazabal	27,638.35	26,841.18
Perseverancia RR	44,014.80	31,932.83
Yaguajay	10,411.39	10,582.17
Damuji	6,523.48	8,807.46
Central de Matanzas	261,365.85	137,077.33
Toledo a San Pedro	23,369.59	12,744.43
Central Portugalete	6,074.39	5,927.42
Hershey Terminal	270,474.13	84,516.89
Total	856,399.82	507,746.21

APPENDIX D

TABLE 24.—*Survey of Sugar-Mill Railroads in Cuba*

Name of mill	Capacity (tons of cane per day)	Location	Kilometers of track				Locomotives	Cars
			56½-inch	36-inch	30-inch	Other		
PINAR DEL RIO PROVINCE								
Andorra	2,310	Artemisa	21	..	23	..	2-S, 3-N	30-S, 83-N
Bahia Honda	1,750	Bahia Honda	18	..	..	..	4-S	55-S
El Pilar	3,120	Artemisa	70	..	..	..	9-S	200-S
La Francia	2,190	La Francia	60	..	..	..	4-S	120-S
Mercedita	2,000	Mercedita	..	40	..	..	5-N	160-N
Niagara	1,310	Niagara	..	20	..	..	2-N	75-N
Orozco	1,750	Orozco	30	..	..	..	4-S	194-S
San Cristobal	2,500	San Cristobal	47	..	..	..	4-S	151-S
San Ramon	1,825	Mariel	..	..	..	33(34")	6-N	130-N
HABANA PROVINCE								
Amistad	2,875	Guines	50	..	..	..	6-S	130-S
Fajardo	938	Gabriel	3	..	..	..	..	10-S
Gomez Mena	5,000	San Nicolas	125	..	..	..	7-S	330-S
Habana	1,625	Caimito de Guayabal	..	36	..	..	5-N	120-N
Hershey [1]	8,125	Hershey	320	..	..	..	7-S	468-S
Josefita	1,875	Palos	15	..	..	..	4-S	80-S
Mercedita	3,130	Melena del Sur	..	..	70	..	8-N	50-S, 462-N
Occidente	813	Guiro Marrero	6	..	..	..	..	18-S
Portugalete	2,250	Cuatro Caminos	3	..	3	..	2-S, 1-N	135-N
Providencia	2,750	Providencia	10	..	50	..	1-S, 4-N	19-S, 155-N
Rosario	2,125	Aguacate	40	..	..	..	5-S	111-S
San Antonio	2,250	Madruga	52	..	..	..	6-S	168-S
Toledo	4,875	Marianao	100	100	..	..	21-S & N	227-S
MATANZAS PROVINCE								
Alava	3,940	Banaguises	123	48	..	..	11-S, 4-N	149-S, 186-N
Araujo	1,875	Manguito	3	32	..	..	3-S, 2-N	19-N
Australia	2,000	Jaguey Grande	32	..	..	..	4-S	80-S
Carolina	1,750	Coliseo	9	..	..	..	3-S	100-S
Conchita	3,950	Conchita	38	40	..	..	10-S, 4-N	119-S, 144-N
Cuba	5,400	Pedro Betancourt	60	..	..	..	5-S	250-S
Dolores	1,250	Jovellanos	12	..	..	..	3-S	37-S
Dos Rosas	1,250	Cardenas	..	..	30	..	4-N	132-N
Espana	6,875	Espana	153	..	..	..	17-S	350-S
Guipuzcoa	3,500	Marti	15	..	65	..	10-S & N	290-N
Limones	3,120	Limonar	35	..	..	..	6-S	140-S
Mercedes	4,060	Mercedes	65	..	..	..	10-S	242-S
Porfuerza	2,310	Porfuerza	38	..	..	..	3-S	106 S
Progreso	2,125	Progreso	21	..	..	..	4-S	100-S
San Ignacio	1,620	Agramonte	18	..	..	..	2-S	..
Santa Amalia	2,000	Coliseo	20	..	..	..	3-S	110-S
Santo Domingo	2,000	Union de Reyes	12	..	..	..	3-S	83-S
Santa Rita	1,560	Baro	7	8	..	..	5-S	36-N
Soledad	2,250	Jovellanos	6	30	..	..	6-S, 3-N	125-S, 60-N
Tinguaro	3,300	Tinguaro	50	..	..	..	8-S	213-S
Triunfo	1,125	Limonar	..	..	..	..	..	15-S
Zorilla	1,875	Cautro Esquinas	6	50	..	..	2-S, 4-N	46-S, 70-N
SANTA CLARA PROVINCE								
Adela	2,190	Adela	..	80	..	..	6-N	222-N
Amazonas	1,625	Guasimal	..	..	30	..	2-N	100-N
Andreita	2,500	Cruces	3	..	40	..	6-N	41-S, 180-N
Caracas	3,750	Cruces	15	..	50	..	2-S, 5-N	50-S, 200-N
Carmita	1,820	Carmita	25	..	..	..	3-S	116-S
Constancia	2,500	Constancia	..	..	138	..	11-N	608-N
Constancia	2,750	Encrucijada	3	..	49	..	4-N	140-N
Corazon de Jesus	1,625	Sitiecito	4	..	..	..	2-S	35-S
Covadonga	2,620	Covadonga	80	..	..	..	6-S	151-S

Digitized by Google

TABLE 24.—*Survey of Sugar-Mill Railroads in Cuba*—Continued

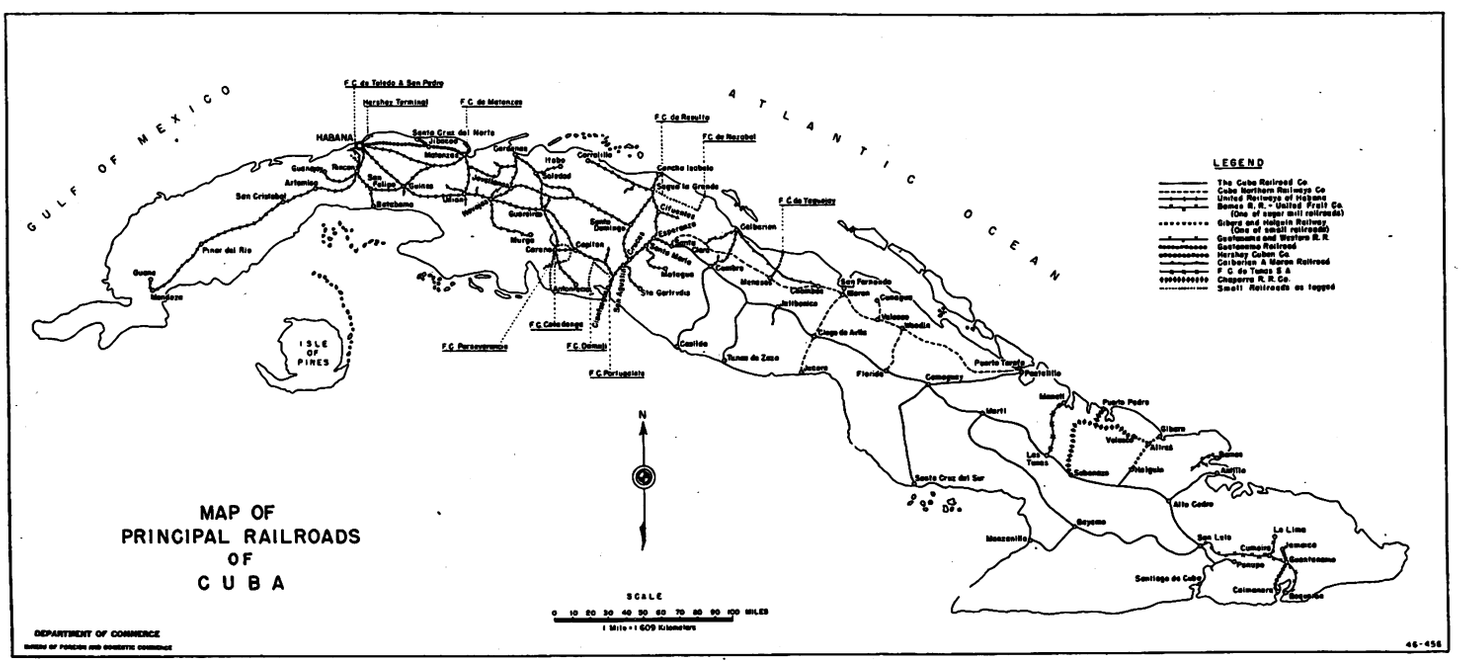
Name of mill	Capacity (tons of cane per day)	Location	Kilometers of track				Locomotives	Cars
			56½-inch	36-inch	30-inch	Other		
Escambray	1,625	Escambray	8	..	..	..	2-S	110-S
Fe	3,120	Salamanca	53	42	..	..	6-S, 3-N	116-S, 80-N
Fidencia	1,625	Placetas	2	..	..	..	3-S	25-S
Holmiguero	3,380	Holmiguero	5	..	90	..	1-S, 7-N	386-N
La Vega	1,500	Guayos	12	..	..	..	3-S	25-S
Macagua	1,690	Mata	..	..	39	..	3-N	66-N
Manuelita	2,380	Palmira	..	..	50	..	8-N	190-N
Narcisa [2]	4,400	Narcisa	..	..	..	..	..	..
Natividad	1,375	Guasimal	..	22	..	..	6-N	130-N
Nazabal	3,120	Encrucijada	..	..	100	..	8-N	240-N
Nela	1,125	Mayujigua	..	..	..	35.5 (26" gage)	5-N	120-N
Parque [3]	1,500	Parque Alto	..	..	..	..	..	..
Pastora	1,875	San Juan de las Yeras	..	..	30	..	4-N	142-N
Perserverancia	3,750	Perserverancia	152	..	..	..	10-S	154-S
Portugalete	1,625	Palmira	10	..	24	..	1-S, 5-N	33-S, 125-N
Purio	2,500	Calabazar de Sagua	..	..	66	..	5-N	178-N
Ramona	2,250	Ramona	2	119	..	..	1-S, 3-N	183-N
Reforma	2,500	Reforma	50	..	..	..	6-S	117-S
Resolucion	1,500	Ramona	5	..	12	..	1-S, 1-N	53-S, 23-N
Resulta	2,800	Sagua la Grande	..	..	67	..	7-N	170-N
San Agustin	3,750	Cruces	9	77	..	..	2-S, 5-N	40-S, 190-N
San Agustin	2,500	San Agustin	9	77	..	..	2-S, 5-N	40-S, 190-N
San Francisco	1,500	Cruces	5	..	22	..	1-S, 4-N	100-N
San Isidro	2,380	Quemado de Guines	8	..	104	..	2-S, 6-N	43-S, 33-N
San Jose	2,370	San Jose	..	42	..	..	6-N	220-N
San Pablo	1,250	Zulueta	4	4	..	..	2-N	54-N
Santa Catalina	2,500	Cruces	10	..	..	..	3-S	36-S
Santa Isabel	2,870	Fomento	50	..	..	..	5-S	110-S
Santa Lutgarda	2,310	Mata	21	..	..	..	4-S	125-S
Santa Maria	2,120	Ranchuelo	10	..	..	..	2-S	114-S
Santa Rosa	1,875	Ranchuelo	12	22	..	..	3-S, 3-N	100-S, 80-N
Santa Teresa	3,250	Sitiecito	35	29	..	..	5-S, 3-N	66-S, 92-N
Soledad	2,250	Cienfuegos	..	..	67	..	8-N	178-N
Trinidad	2,200	Iznaga	6	..	27	..	2-N	127-N
Tuinicu	3,750	Tuinicu	42	..	..	..	5-S	210-S
Ulacia	1,750	Rodrigo	14	..	28	..	5-N	17-S, 95-N
Unidad	1,750	Unidad	46	..	..	..	5-S	120-S
Vitoria	2,250	Yaguajay	..	..	..	130 (27½")	11-N	400-N
Washington	2,750	Hatuey	97	..	..	..	9-S	239-S
Zaza [4]	2,510	Placetas	..	35	..	..	2-N	
CAMAGUEY PROVINCE								
Adelaida	3,750	Falla	115	..	..	..	5-S	175-S
Algodones	3,120	Algodones	71	..	..	..	5-S	102-S
Baragua	6,250	Baragua	109	..	..	..	5-S	408-S
Cespedes	3,750	Cespedes	70	..	..	..	8-S	260-S
Cunagua	7,500	Cunagua	125	..	..	..	9-S	320-S
Estrella	3,900	Cespedes	202	..	..	..	18-S	645-S
Florida	3,750	Florida	57	..	..	..	7-S	299-S
Francisco	7,200	Francisco	177	..	..	..	9-S	319-S
Jaronu	12,500	Jaronu	165	..	..	..	15-S	465-S
Jatibonico	5,650	Jatibonico	156	..	..	..	5-S	340-S
Lugareno	5,000	Lugareno	38	152	..	..	5-S, 9-N	121-S, 292-N
Macareno	3,000	Manopla	60	..	..	..	6-S	200-S
Moron	9,350	Pina	246	..	..	..	15-S	424-S
Najassa	2,000	Najassa	34	..	..	..	3-S	100-S
Patria	2,000	Moron	35	..	..	..	7-S	105-S
Punta Alegre	3,000	Puerto San Juan	150	..	..	..	8-S	456-S
Santa Marta	3,750	Santa Marta	72	..	..	..	3-S	140-S
Senado	6,000	Minas	66	..	89	..	3-S, 2-N	100-S, 556-N
Siboney	1,750	Siboney	20	..	..	..	3-S	100-S
Stewart	8,120	Stewart	201	..	..	..	[5]22-S	549-S
Vertientes [6]	9,700	Vertientes	..	..	..	..	..	..
Violeta	7,100	Violeta	160	260	..	..	4-S, 4-N	157-S, 150-N
ORIENTE PROVINCE								
Algodonal [3]	1,250	Algodonal	6	..	..	..	1-S	30-S
Almeida	3,250	Almeida	58	..	..	..	3-S	186-S
Alto Cedro	3,000	Marcane	52	..	..	..	6-S	281-S
America	2,500	America	26	..	..	..	2-S	208-S
Baguanos	3,000	Baguanos	204	..	..	..	6-S	429-S
Borjita	1,620	Dos Caminos	20	..	..	..	2-S	148-S
Boston	7,500	Banes	241	..	..	..	12-S	489-S
Cacocun	1,620	Holguin	28	..	..	..	3-S	60-S
Cape Cruz	1,250	Ensenada de Mora	..	..	29	..	6-N	121-N
Chaparra	7,500	Chaparra	..	615	..	..	35-N	2369-N
Delicias [8]	9,750	Delicias	..	..	..	..	..	..
Dos Amigos	1,500	Campechuela	..	35	..	..	4-N	100-N
Ermita [9]	1,500	Ermita	27	..	..	..	..	130-S
Esperanza	2,120	Guantanamo	6	..	..	22 (31½")	3-N	100-S, 80-N
Estrada Palma	2,500	Yara	32	..	..	..	2-S	100-S
Isabel	2,870	Media Luna	..	77	..	..	8-N	323-N
Isabel [9]	1,750	Guantanamo	20	..	..	..	..	..
Jobabo	5,600	Jobabo	103	..	..	..	7-S	347-S

Digitized by Google

TABLE 24.—*Survey of Sugar-Mill Railroads in Cuba*—Continued

Name of mill	Capacity (tons of cane per day)	Location	Kilometers of track				Locomotives	Cars
			56½-inch	36-inch	30-inch	Other		
Los Canos	2,250	Guantanamo	..		50	..	?	243-N
Mabay	1,850	Julia	25	..	..	..	2-S	74-S
Maceo	1,625	Maceo	30	..	..	..	3-S	68-S
Manati	8,750	Manati	144	198	..	..	8-S, 8-N	349-S, 530-N
Miranda	6,250	Miranda	208	..	..	..	9-S	600-S
Niquero	2,800	Niquero	..	86	..	..	7-S, 1-N	307-N
Ofelia	1,620	Ceiba Hueca	..	35	..	..	5-N	140-N
Palma	3,850	Palma	127	..	..	..	9-S	407-S
Preston	10,000	Preston	294	..	..	..	11-S	795-S
Rio Cauto	2,750	Rio Cauto	72	..	..	..	6-S	250-S
Romelie [9]	1,500	Guantanamo	..	..	..	..	..	60-S
Salvador	1,000	Calicito	..	36	..	..	5-N	105-N
San Antonio	1,130	Guantanamo	..	26	..	..	4-N	100-N
San German	6,900	San German	203	..	..	..	9-S	470-S
San Ramon	1,500	Manzanillo	..	18	..	..	3-N	55-N
Santa Ana	2,200	Auza	41	..	..	..	5-S	205-S
Santa Cecilia	1,620	Guantanamo	..	26	..	..	2-N	50-S, 72-N
Santa Lucia	3,120	Santa Lucia	..	..	160	..	9-N	502-N
Sofia	975	Yara	9	..	..	..	..	129-N
Soledad	2,500	Guantanamo	18	22	..	..	2-N	..
Tacajo [10]	3,750	Tacajo	..	..	..	..	..	..
Tanamo	3,750	Cayo Mambi	..	175	..	..	6-N	390-N
Grand Total	481,086		6,818	2,709	1,602	220.5		

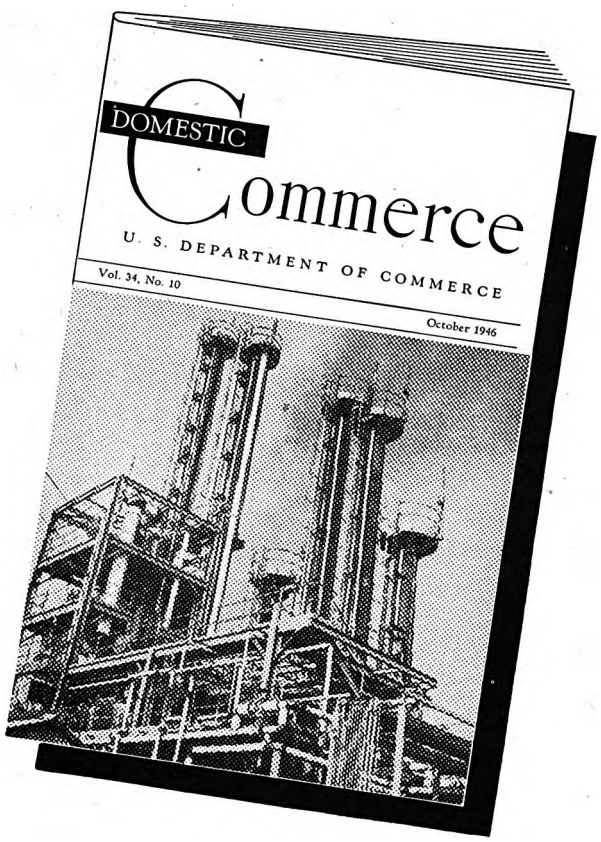
[1] Served by electrified public carrier—Hershey RR.
[2] Served by public-carrier railroad.
[3] Served by public carrier—Parque Alto-Mididas Ry (narrow gage).
[4] Cane handled by United Railways.
[5] Also use eight locomotives formerly belonging to Jagueyal.
[6] See Central Estrella—combined Lines.
[7] Served by Cuba RR.
[8] See Central Chaparra.
[9] Served by Guantanamo RR.
[10] See Baguanos.



★ U. S. GOVERNMENT PRINTING OFFICE: 1946—707802—203

Digitized by Google

Every Businessman Could Profit by Reading . . .



Pocket Size

DOMESTIC COMMERCE

96 Pages of Facts and Ideas!

- Timely news on problems that face businessmen today.
- Marketing information on numerous business activities.
- Economic surveys and trends.
- New products being designed for consumer use.
- Progress and changing conditions of industry and business.
- Monthly listing of all business service material published by the U. S. Department of Commerce.
- What's New—a regular feature on patents dedicated for public use, and new and abandoned patents.

These are typical of the material currently appearing. Articles written by specialists in the U. S. Department of Commerce as well as those of other governmental agencies.

Annual Subscription $1

Order today from the
Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.
(Make check payable to Treasurer, U. S. A.)

Digitized by Google

Documents Room

Industrial Reference Service

U. S. DEPARTMENT OF COMMERCE, W. AVERELL HARRIMAN, *Secretary*
Office of International Trade, ARTHUR PAUL, *Director*

Part 1. TRANSPORTATION and PUBLIC UTILITIES

INDIANA UNIVERSITY JAN 23 1947 LIBRARY

Available in Parts Covering Selected Services and Commodities
Annual Subscription $1.50. Price this report 5 cents

For sale by the Superintendent of Documents, Government Printing Office, Washington 25, D. C., or any of the Department's Field Offices

Volume 4—Part 1 | December 1946 | Number 31

D 17.518

Railways of Sweden

By Seymour T. R. Abt, Transportation and Communications Division, Special Services and Intelligence Branch

Based on United States foreign service reports, official Swedish documents, and other sources

Sweden constitutes the southern and eastern part of the Scandinavian peninsula, with an area of 173,403 square miles. Its western frontier toward Norway is mountainous throughout, but there are occasional passes low enough to form easy channels of communication with the Norwegian harbors. Sweden's coastline provides ports along the Gulf of Bothnia on the east, the Baltic on the south, and the Skagerak and Cattegat on the southeast.

Considering its northerly position, Sweden enjoys an especially favorable climate on account of the warm Gulf Stream, which passes the western coast of Norway and sends an arm into the Skagerak. There are, however, considerable variations in climate from the northernmost parts of Sweden to its southern coast, because of the country's great extension from north to south.

Economy

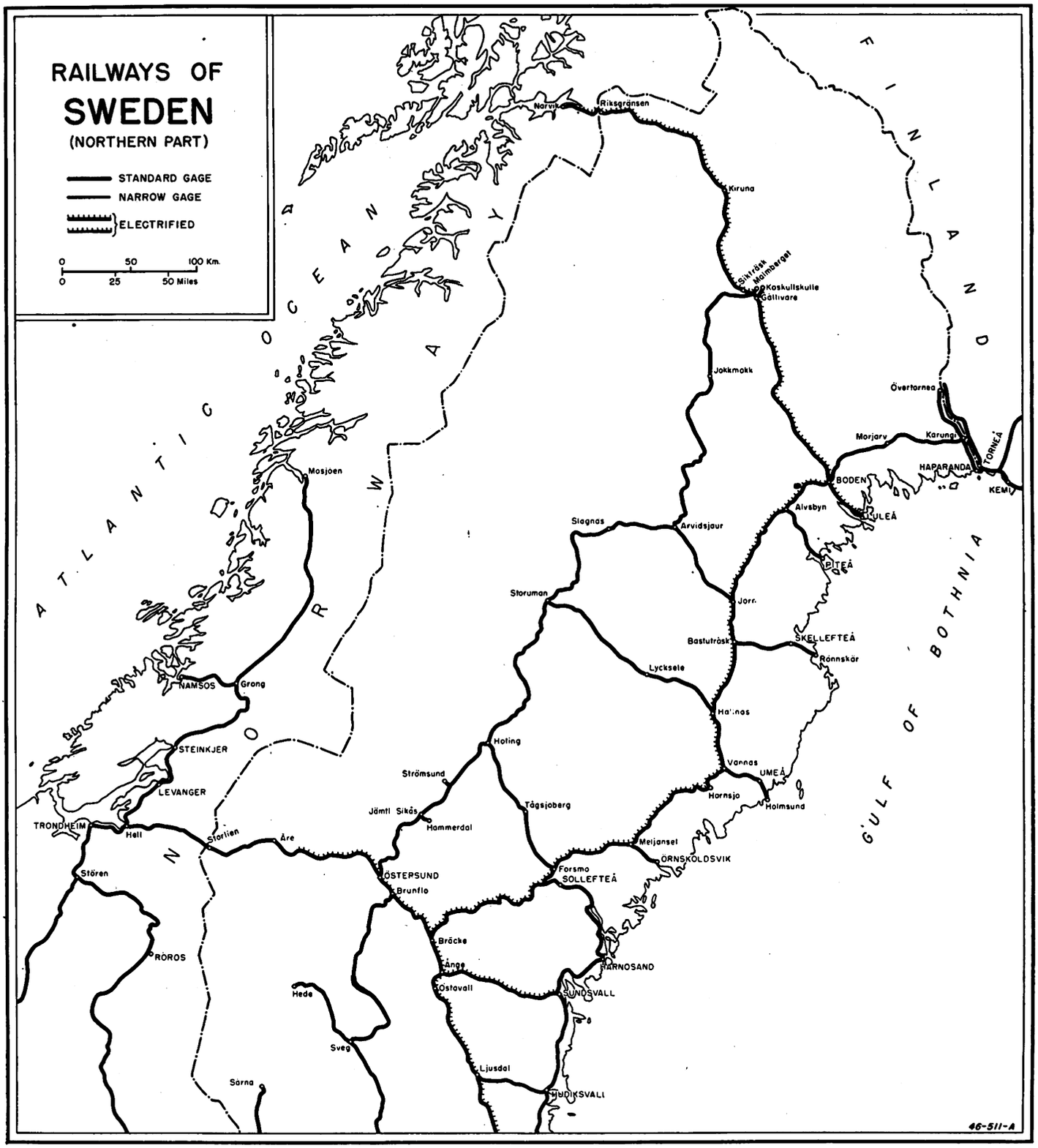
About one-half of Sweden's population of 6,500,000 still depends upon agriculture for a livelihood, but there has been a continuous trend toward the development of an industrial economy. Mining has long been the country's leading industry, and the iron deposits in Lappland and Central Sweden are famous throughout the world. A lack of domestic fossil fuel, however, necessitates the importation of large quantities of coal and coke. Rich forest resources have been instrumental in making Sweden a leader in the production of lumber, wood pulp, paper, and matches. Iron and steel manufacture, cutlery, shoes, textiles, rubber products, stone, cement, and glass products are also produced in considerable quantities. Sweden's industries generally specialize in the manufacture of high-quality goods which have a world market. On the other hand, the high standard of living for which Sweden is famous maintains a domestic demand for many products.



Courtesy, Swedish State Railways

A State Railways freight train on the scenic line between Ostersund and the Norwegian border.

Digitized by Google

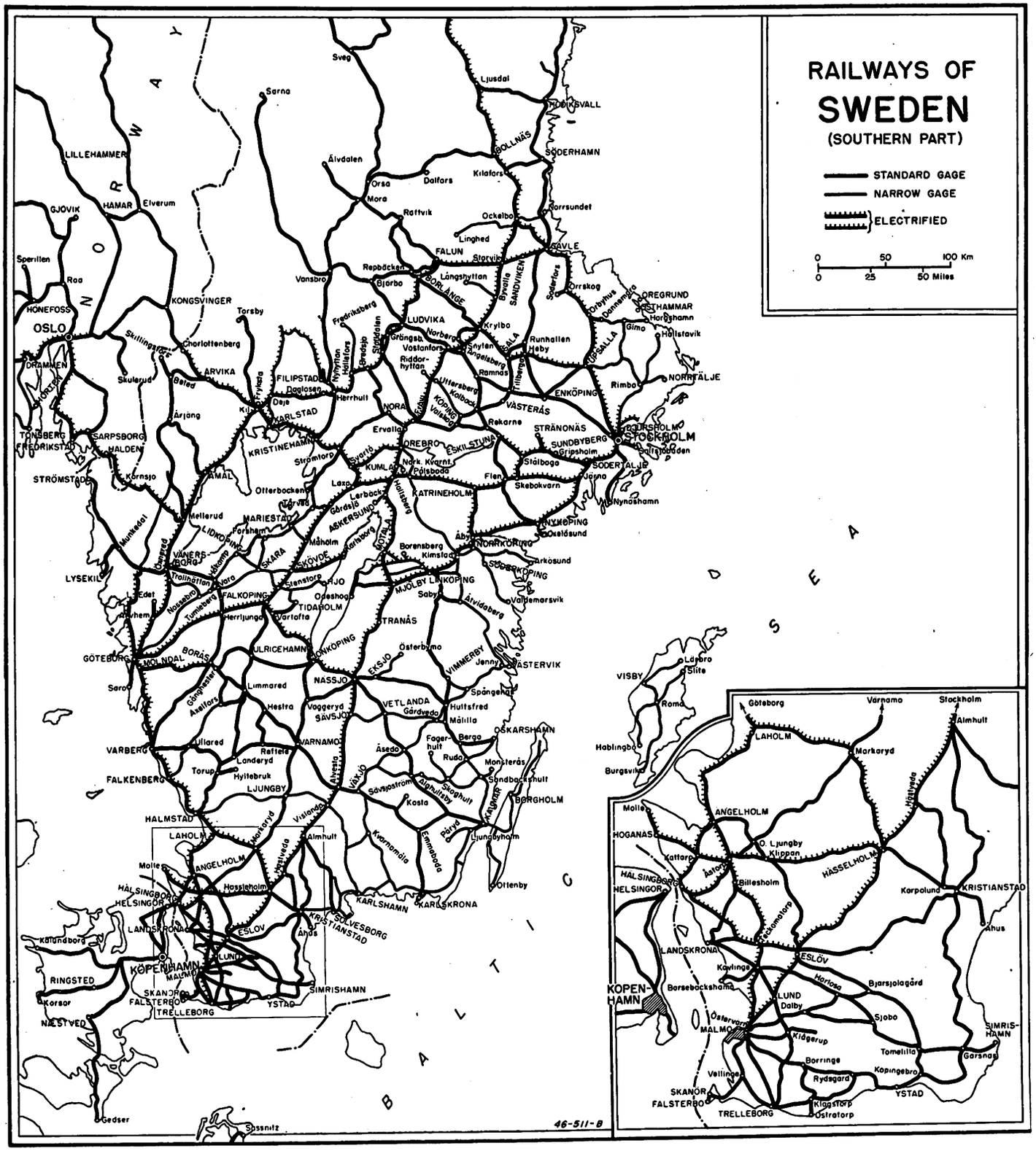


Transportation

Sweden's international trade and travel are facilitated by good transportation. The country has a merchant fleet of about 2,100 vessels, aggregating 1,700,000 gross tons. Göteborg clears the largest tonnage yearly, and Stockholm the second largest. Commercial aviation has been carried on by the AIB Aerotransport with the help of a Government subsidy of about 500,000 kronor annually. A daily service is maintained in each direction, jointly with foreign companies, with other European countries. Before the war the State Railways operated train ferries between Swedish ports and Denmark and Germany. This service has already been resumed between Malmö and Copenhagen, and probably between Trelleborg and Sasnitz. In addition, two weekly round trips are now being made between Trelleborg and Gdynia, under the terms of a 3-year agreement between the Swedish and Polish Governments.

Internally, the railroads are Sweden's prime form of transportation, but highway traffic has developed rapidly in the last 20 years. There are more than 55,000 miles of roads in Sweden, and busses and trucks are offering the railways serious competition. As a result, new railway construction has stopped completely, and some of the minor

Digitized by Google



lines have curtailed or ceased operations.

The railways have instituted several means of combating the competition. Railroad rates have been lowered. In an attempt to provide door-to-door service, which is one of the road carriers' strongest selling points, the railways have organized delivery-truck operations to offer this service to their customers. Since 1935 the Government has been buying the private truck and bus lines that lie within the area served by the State Railways. Where highway lines serve communities not reached by the State Railways, the policy has been for both forms of transportation to organize cooperative service for their mutual benefit.

Railways of Sweden

Sweden has a modern, efficient, well-distributed railway system that reflects a farsightedness unusual in railroad history. A century ago, when the world first began to see the potentialities of railroads, the universal method was to construct lines when and where they seemed desirable, without regard to long-term considerations. In Sweden, however, after a brief period of uncertainty, the *Riksdag* of 1847-48 decided that there should be a nation-wide system, with the State taking the lead in its construction. A detailed investigation into the entire railway

Digitized by Google

question was then undertaken, and its results were laid before the *Riksdag* of 1853-54. This legislature formulated the policy that trunk lines should be paid for, owned, and operated by the State, and that smaller lines should be built by private companies with State support. Although there have been some deviations from its principles, this policy has always been basic in Swedish railway development, and since 1930 there has been a marked trend toward nationalization of the private lines.

At the end of March 1946 there were 10,350 miles of railroad in operation in Sweden. Of the total, 7,701 miles, or 74 percent, were included in the State Railways. All other mileage was divided among 35 private lines. This percentage of State lines is the highest in Swedish history and it is possible that at some future date all the common carriers will be part of the one system. Nationalization of private lines has always been accomplished by negotiations resulting in terms agreeable both to the owners and the Government. There has been no resort to expropriation.

Gage.—Although the European and American standard gage of 4 feet 8½ inches (1.435 meters) is also standard in Sweden, at the end of 1944 there were 2,146 miles of narrow-gage lines, of which 667 miles of two gages belonged to the State Railways. Private narrow-gage lines included 36 miles of 1.093 meter gage, 40 miles of 1.067 meter gage, 1,373 miles of 0.891 meter gage, and 30 miles of 0.802 meter gage. Most of the main trunk lines, both State and private, are of standard gage, although there are some outstanding exceptions. The narrow-gage roads, however, tie in with those of standard gage and present problems occasioned by the lack of interchangeability of equipment. The Swedish authorities recognize the disadvantages of having more than one gage, and in 1944 a Government committee began to study the question of standardization. The recommendations of this committee may result in the gradual standardization of all the narrow gages.

Double tracking.—At the end of 1944 there were only 353 miles of double-track line in Sweden, of which 338 miles were on the State Railways. The desirability of extending the double tracking became apparent during the war, when both freight and passenger traffic increased enormously. A scarcity of labor and certain raw materials mitigated against the construction of additional double track at that time. The return to peacetime levels of traffic and employment will undoubtedly allow further double tracking, especially during periods of marked unemployment.

Electrification.—The lack of natural fossil fuel coupled with the existence of abundant water power prompted Sweden to initiate the electrification of its railways as long ago as 1910. In that year the Lappland iron-ore line was electrified between Kiruna and Riksgränsen and in 1923 the remainder of the line, between Kiruna and Luleå, was electrified. The results achieved by the new form of motive power were highly favorable. The size of ore trains could be increased by 40 percent and their average speed doubled after the electrification. The Stockholm-Göteborg line was next electrified, in 1926, and in 1931 the Government began an extensive electrification program. This program proved its worth during the war, when coal was scarcer than ever, and curtailed highway transport forced the burden of the heavy war traffic on the railroads.

By the end of March 1946 there were 3,497 miles of electrified line in Sweden, of which 2,899 miles were State Railway lines. Electric traction is now provided between Malmö, Göteborg, and Stockholm. Oslo, Norway, is connected by electrified line with the Swedish railway system. Electric-powered trains can now run from Trelleborg on the Baltic the length of Sweden and on to the Norwegian port of Narvik. The electrification program is still continuing. The Stockholm-Tillberga-Köping and Köping-Frövi sections, for example, are scheduled for electrification by 1947.

Railway-equipment industry.—The Swedish railway-equipment industry was highly developed before the war, supplying most of the nation's domestic needs, as well as large quantities for export. Locomotives, for example, had been exported since the end of the 1860's, to Norway, Denmark, Finland, the U.S.S.R., and Argentina.

During the last 20 years, locomotive manufacturers have been concentrating on the production of electric locomotives, to keep pace with the rapid electrification of the Swedish railways. The electrical equipment for these locomotives has been supplied chiefly by ASEA, the largest company producing electrical equipment in Sweden.

Domestic manufacture has been sufficient to meet the Swedish demand for railway cars since 1877. Rail production increased rapidly during the war years, and Domnarfvets Jernverk in Domnarvet is the country's leading manufacturer of rails. It is believed, however, that Sweden will still import some rails in the future.

The accompanying listing shows the chief Swedish firms manufacturing railway equipment in 1945:

Swedish Manufacturers of Railway Equipment, 1945

Company name	*Address*	*Products*
Allmänna Svenska Elektriska AB...	Västeras.....	Accumulator locomotives Diesel-electric locomotives Electric locomotives Diesel-electric railcars Railway coach and motorcar lighting equipment
Atvidabergs Spårväxlar & Signalfabriks AB.....	Stockholm.....	Electrical and mechanical railway signal equipment Railway and tramway points and switches
AB Chr. Olsson.....	Värtan, Stockholm.	Tank cars
Domnarfvets Jernverk.....	Domnarvet.....	Rails
Jonsereds Fabrikers AB.....	Jonsered.....	Machine tools for railway and locomotive shops
Kockums Mekaniska Vekstads AB..	Malmö.....	Diesel-electric locomotives Motor locomotives Railway coaches and cars Diesel-electric railcars Motor railcars Railway forgings
AB Motala Verkstad.....	Motala.....	Electric locomotives Motor locomotives Steam locomotives Railway forgings
AB Nordiska Armaturfabrikerna....	Linköping.....	Airbrakes for railway cars
Nydquist & Holm.....	Trollhättan.....	Diesel-electric locomotives Electric locomotives Motor locomotives Steam locomotives Turbine locomotives Railway coaches and cars Diesel-electric railcars Motor railcars
Svenska Aktiebolaget Bromsregulator	Malmö.....	Brake regulators for railway cars Railway car wheels
Svenska Aktiebolaget Gasaccumulator	Stockholm-Lidingö.	Railway light signaling equipment Railway coach and motorcar lighting equipment
AB Svenska Järnvägsverkstäderna..	Linköping.....	Accumulator locomotives Electric locomotives Steam locomotives Railway coaches and cars Motor railcars Railway forgings Springs for railway cars and locomotives

Digitized by Google

Swedish Manufacturers of Railway Equipment, 1945

Telefonaktiebolaget L. M. Ericsson	Stockholm	Railway light signaling equipment
C. A. Wallenborg & Son	Stockholm	Steam locomotives Diesel-electric locomotives Motor locomotives Diesel-electric railcars Springs for railway cars and locomotives Railway car wheels
Henry Wallenberg & Co.	Stockholm	Diesel-electric locomotives Electric locomotives Motor locomotives Steam locomotives Railway coaches and cars Diesel-electric railcars Motor railcars Railway forgings Springs for railway cars and locomotives Railway car wheels Sawn and hewn railway sleepers

STATE RAILWAYS *(Statens Jarnvagar)*.—The State Railways are owned and operated by the Swedish Government. The head offices are located in Stockholm.

At the end of 1944 the State Railways owned 6,945 miles of line, of which 6,278 were standard gage (including 2,798 miles of electrified line), 278 were 1.067 meter gage, and 389 were 0.891 meter gage. In addition, the State Railways operated 11 miles of privately owned line. Of the total mileage, there were also 338 miles of double track on main lines, 1,915 miles of station sidings (probably yard tracks), and 201 miles of industrial and port lines.

Permanent Way and Structures

Curvature and gradient.—The minimum curve radius on Swedish railways is 1,000 feet (about 300 meters). The maximum gradient is 2.5 percent. Table 1 gives some statistics indicating the severity of curvature and gradient of Swedish State Railways.

TABLE 1.—*State Railways—Curvature and Gradient, December 31, 1944*

Item	Standard gage	Narrow gage
Percentage of straight line	65.6	69.7
Percentage of line with curvature radius more than 500 meters	27.1	16.3
Percentage of line with curvature radius less than 500 meters	7.3	14.0
Miles of straight line	4,116	465
Miles of curved line	2,162	202
Percentage of level line	31.1	39.9
Percentage of line with grades up to 0.5 percent	20.7	15.4
Percentage of line with grades from 0.5 to 1 percent	31.0	19.0
Percentage of line with grades from 1 to 2.5 percent	17.2	25.7
Miles of level line	1,952	266
Miles of gradient line	4,326	401

Ballast.—Sand, gravel, coal ash, and macadam are used as ballast. In recent years macadam has come into extensive use.

Ties.—Cross ties are wood, either impregnated or unimpregnated. Boliden salt and Basilit are used as impregnation agents.

Rails.—Four kinds of rails are used:

Model	*Kilograms per meter*	*Average length (in meters)*
1896	40.5	10-15
1899	34.0	10
1924	43.5	15-20
1940	50	20

Bridges and crossings.—At the end of 1944 there were 483 large bridges (i.e., those with a total length of 49.2 feet or over, and those of any length constructed of girders and joists) and 1,659 small bridges. There were also 44 crossings over other railway lines and 29 under other railway lines; 414 crossings over streets or main roads, and 441 under streets and main roads; 333 crossings over other roads and 163 under other roads; and 27 stationary bridges and 27 drawbridges over canals and other public boatways.

Tunnels.—At the end of 1944 the State Railways had 60 tunnels with a total length of 36,539 feet.

Grade crossings.—At the end of 1944 there were 3,153 grade crossings at streets and main roads, and 23,771 at other roads.

Facilities.—At the end of 1944 the State Railways had 210 roundhouses, 172 coal stations, and 381 water stations. Electric power is obtained from plants of the Vattenfallsstyrelsen and the Sydsvenska Kraft AB. The main repair shops are at Örebro, Göteborg, Tomteboda, Malmö, Ostersund, Bollnäs, Notviken, and Hälsingborg.

Equipment

Locomotives.—At the end of 1945 the Swedish State Railways had the following standard-gage motive power: 578 electric locomotives, 729 steam locomotives, 155 internal-combustion locomotives, and 175 rail busses. The narrow-gage motive power at the end of 1944 included 88 steam locomotives, 7 internal-combustion locomotives, 23 rail busses, and 7 other motor-rail cars.

Recent studies made by the State Railways indicate that future electric locomotives will be of 3,500 h.p., and be suitable for a maximum speed on the level of 84 m. p. h. with a 590-ton train. These specifications are intended to meet immediate requirements, but also include a margin for probable future demands. Line voltage: 16,000 volts, single-phase, alternating current, 16⅔ cycles.

In 1945 the State Railways ordered 10 large steam freight locomotives from Nydqvist & Holm and the tenders from the AB Svenska Järnvägs-Verkstäderna. This was the first contract for steam locomotives (except for three small narrow-gage engines) to be signed by the State Railways in more than 20 years, during which electrification was extended and the length of steam-worked lines reduced. The average age of steam locomotives is 33 years, and more than 100 are over 40 years old. There are about 80 steam locomotive types on the State lines, largely as a result of acquisitions from private lines taken over by the State Railways.

The State Railways are interested in purchasing diesel-electric switch engines. The administration has indicated to the United States Legation that it would be pleased to establish contact with manufacturers in the United States.

Fuel consumption in 1945 amounted to 883,781,000 kwh and 422,999 metric tons of fossil fuel (converted to the basis of imported coal). The lack of indigenous coal in Sweden and the dislocations in foreign trade occasioned by the war have created a severe coal shortage for the railways. Wood is used for fuel, and its movement complicates transportation problems.

Freight cars.—At the end of 1945 the Swedish State Railways had 9,428 standard-gage, two-axled, closed freight cars, 17,334 standard-gage open freight cars, and 1,188 standard-gage charcoal cars. A more detailed break-down of the statistics is available for 1944:

TABLE 2.—*State Railways—Freight Cars, December 31, 1944*

Item	Gage		
	Standard	1.067-meter	0.891-meter
Closed	9,022	203	222
Open	17,490	998	937
Ore	3,751	..	..
Special	158	10	22
Total (owned cars)	30,421	1,211	1,181
Types (exclusive of special):			
2-axle	26,083	1,198	1,119
3-axle	6	..	24
4-axle	420	3	16
6-axle	3	..	..
3-axle, ore	3,751	..	..
Capacities in metric tons (exclusive of special):			
Less than 10	205	428	516
10-12	3,126	612	590
12.1-14	385	155	8
14.1-16	2,106	..	45
16.1-18	8,664	3	..
18.1-20	9,107	..	..
20.1-25	2,488	3	..
25.1-30	8	..	..
30.1-40	377	..	..
More than 40	46	..	..
30 (ore cars)	283	..	..
35 (ore cars)	3,468	..	..

Digitized by Google

In addition to the above, the State Railways employed 790 standard-gage cars and one of 1.067-meter gage which belonged to concerns other than the State Railways. Of this total, 122 were standard-gage ore cars.

Passenger cars.—At the end of 1945 the State Railways had 3,480 standard-gage passenger cars. In 1944, passenger cars were classified as follows:

TABLE 3.—*State Railways—Passenger Cars, December 31, 1944*

Item	Gage		
	Standard	1.067-meter	0.891-meter
Coaches (including diners and combination)	2,534	78	63
Mail (including combination mail and baggage)	165	6	2
Baggage	676	42	30
Rail-bus trailers	59	3	13
Total (owned cars)	3,434	129	108
Types:			
2-axle coaches, mail, and baggage	1,714	86	54
4-axle coaches, mail, and baggage	1,661	40	41
2-axle rail-bus trailers	51	1	5
4-axle rail-bus trailers	8	2	8
Capacity:			
1st-class seats	119	..	..
2nd-class seats	8,115	230	..
3rd-class seats	149,138	3,184	3,644
Total seats	157,372	3,414	3,644
2nd class berths [1]	1,964	..	..
3rd-class berths	2,451	..	..
Total berths	4,415	..	..
Baggage car (including combination) tonnage	7,617	315	243
Rail-bus and motor rail car tonnage	171	5	30

[1] 1st-class accommodations are 2nd-class compartments sleeping one person instead of two. 3rd-class compartments sleep three.

Brakes.—The type of brake in general use on the Swedish railways is the German Kuntze-Knorr. On express passenger cars the Hildebrand-Knorr system is used. These are manufactured in Sweden under license. The agent is Ingeniörsfirman Hugo Tillquist, 7 Nybrokajen, Stockholm, and the licensee and manufacturer is AB Nordiska Armaturfabriken, Stockholm.

Couplings.—The most widely used coupling on the State Railways is a manual type consisting of a loop and a hook, which can be regulated by a screw. The modern rail busses, however, are experimenting with an automatic coupling, the "Scharfenberg," manufactured by a German concern and sold in Sweden by Ingeniörsfirman Gunnar Dellner, Stockholm.

Air conditioning.—The Swedish State Railways have introduced a modified form of air conditioning. During the winter, heat is generated by electricity, filtered, and forced by fans through channels into the compartments. During the summer months, the outside air is filtered and blown by fans into the compartments. Since 1933 all new express passenger cars built have been equipped with air conditioning, and such satisfactory results have been obtained that all cars built in the future will be equipped with it.

Traffic

Freight.—In 1945 the Swedish State Railways carried 27,750,387 metric tons of freight and 332,039 head of livestock.

A more detailed statement of freight traffic is available for 1944. In that year the State Railways hauled 28,323,112 metric tons of revenue freight. Of this total, 19,344,314 metric tons were originated on and received by State Railways stations and the remaining 8,978,798 metric tons were handled by other lines as well as the State Railways. The average haul was 134 miles.

The leading class of commodities in terms of quantity carried, is timber products, as a result largely of the widespread use of wood as fuel during the severe coal shortage. Lappland iron ore, for which Sweden is famous, is next on the list. A complete list of commodity classes, whose traffic exceeded a million metric tons in 1944, is given in table 4.

TABLE 4.—*Swedish State Railways—Leading Commodities Carried, 1944*

Class	Metric tons	Thousands of ton-kilometers	Average haul (miles)
Timber products	5,267,032	1,567,812	185
Lappland iron ore	3,039,501	654,206	134
Coal, charcoal, and peat	2,284,768	472,559	129
Subsistence	2,105,058	591,592	175
Ores	2,012,656	206,058	63
Iron and steel	1,748,006	481,457	171
Fodder and fertilizers	1,637,338	291,842	111
Cement, brick, and glass	1,491,198	304,469	127
Stone, gravel, and lime	1,386,322	287,083	129
Sugar beets	1,276,629	17,847	9

Passengers.—In 1944 the Swedish State Railways carried 99,802,574 passengers an average distance of 33 miles each. The great majority of passengers traveled third class (98,545,740). Only 12,009 traveled first class and 1,244,825 second class.

Operations

In 1945 the State Railways earned revenues of 570,107,707 Kronor (1 krona equals $0.2390), of which Kr. 321,419,536 were received from freight traffic, Kr. 282,161,444 from passenger traffic, Kr. 12,925,215 from mail traffic, and Kr. 7,601,512 from other operations.

Expenses during the year amounted to Kr. 527,155,688, giving a profit of Kr. 42,952,019.

The total investment of the Swedish Government in the State Railways stood at Kr. 1,032,786,714 at the close of 1944. During that year the surplus amounted to Kr. 10,287,136.

Employees

In 1944 the number of employees averaged 48,440, including 1,292 in administration, 256 in district offices, 11,017 in line sections (including renting activity), 11,074 in operating sections (including ferries), 21,111 in traffic sections (including truck and bus lines), 299 in supply sections, and 3,391 in main repairshops.

Private Railways

As was noted above, there has been a marked trend in recent years toward the nationalization of Sweden's private railways and their incorporation into the State Railways system. By March 1946 the number of private lines in operation had fallen to 35 and these comprised only 26 percent of the total mileage. Although these railroads are often of vital importance to the areas they serve, they are of lesser importance to the nation as a whole. Salient features of their routes, equipment, traffic, and operations are therefore presented in the following series of tables, with a minimum of text:

Digitized by Google

TABLE 5.—*Private Railways—Lengths and Routes, March 31, 1946*

Railway	Address	Routes	Gage (meters)	Route miles
Askersund-Skyllberg-Lerbäck	Skyllberg	Same as "Rwy"	0.891	9
Bergslagerna	Göteborg	Falun-Göteborg	1.435	307
		Filipstads Västra-Daglösen		
Byvalla-Långshyttan	Långshyttan	Same as "Rwy"	.891	17
Dal-Västra Värmland	Göteborg	Mellerud-Arvika	1.435	156
		Beted-Skillingsfors		
		Arjäng-Åmål		
Dala-Ockelbo-Norrsundet	Jädraås	Linghed-Norrsundet	.891	53
Dalsland	Göteborg	Kornsjö-Mellerud	1.435	43
Dannemora-Harg	Stockholm	Dannemora-Hargshamn	.891	73
		Faringe-Gimo		
Gotland	Visby	Lärbo-Visby-Burgsvik	.891	72
Grängesberg-Oxelösund	Eskilstuna	Ludvika-Köping	1.435	187
		Valskog-Eskilstuna		
		Kolbäck-Oxelösund		
Gävle-Dala	Gävle	Gävle-Falun-Älvdalen	1.435	182
		Falun-Björbo		
Göteborg-Särö	Göteborg	Same as "Rwy"	1.435	15
Halmstad-Bolmen	Halmstad	Halmstad H. B.-Bolmen	1.067	40
Hjo-Stenstorp	Tidaholm	Tidaholm-Svensbro	.891	34
Hällefors-Fredriksberg	Fredriksberg	Same as "Rwy"	.802	30
Kinnekulle-Lidköping	Lidköping	Forshem-Lidköping	.891	18
Kil-Fryksdalen	Göteborg	Kil-Torsby	1.435	51
Klintehamn-Roma	Klintehamn	Hablingbo-Roma	.891	31
Krylbo-Norberg	Kärrgruvan	Krylbo-Kärrgruvan	1.435	14
Köping-Uttersberg-Riddarhyttan	Köping	Same as "Rwy"	1.093	36
Lidköping-Håkantorp	Lidköping	Same as "Rwy"	.891	18
Lidköping-Skövde och Stenstorp	Göteborg	Skövde-Lidköping	.891	43
		Stenstorp-Axvall		
Ljungbyholm-Kalslunda	Växjö	Ljungbyholm-Påryd	.891	11
Lödöse-Lilla Edet	Göteborg	Lilla Edet-Alvhem	1.435	9
Malmö-Genarp	Kvarnby	Malmö-Östervärn-Genarp	1.435	17
Mariestad-Moholm	Göteborg	Same as "Rwy"	.891	11
Mellersta Östergötland	Norrköping	Linköping-Ödeshög	.891	104
		Klockrike-Borensberg		
		Ringstorp-Linköping		
		Fornåsa-Motala		
		Linköping-Skänninge		
Nora Bergslag	Nora stad	Ervalla-Otterbäcken	1.435	107
		Nora stad-Bredsjö		
Nordmark-Klarälven	Hagfors	Filipstads Västra-	.891	106
		Karlstads östra-Skoghall		
Norra östergötland	Norrköping	Örebro södra-Finspång	.891	82
		Kimstad-Norrköpings Östra		
Norrköping-Söderköping-Vikbolandet	Norrköping	Norrköpings Östra-Valdemarsvik	.891	63
		Kummelby-Arkösund		
Norsholm-Västervik-Hultsfred	Västervik	Norsholm-Västervik-Hultsfred	.891	126
		Vimmerby-Spångenäs		
Slite-Roma	Slite	Same as "Rwy"	.891	20
Stockholm-Nynäs	Nynäshamn	Älvsjö-Nynäshamn	1.435	35
Stockholm-Roslagen	Stockholm	Stockholms Östra-	.891	130
		Hallstavik		
		Rimbo-Uppsala Östra		
		Roslagsnäsby-Österskär		
		Rimbo-Norrtälje		
		Stockholm Engelbrektsplan-Eddavägen		
		Djursholms Ösby-Djursholms Ekeby		
		Djursholms Ösby-Näsbypark		
		Stocksund-Långänstorp		
Stockholm-Saltsjön	Stockholm	Stockholm-Saltsjöbanan-	1.435	11
		Saltsjöbaden		
		Igelboda-Solsidan		
Södra Dalarne	Hedemora	Krylbo-Rättvik	1.435	83
Trollhättan-Nossebro		Same as "Rwy"	.891	20
Västergötland-Göteborg	Göteborg	Göteborg Västg.-Skara-	.891	162
		Gårdsjö		
		Håkantorp-Tumleberg		
		Torved-Gullspång		
Ängelholm-Klippan	Hälsingborg	Same as "Rwy"	1.435	16
Öland	Mörylånga	Böda-Borgholm-Ottenby	.891	94

Double tracking.—Of the private railways in operation in July 1945 the following had double-tracking: Gävle-Dala, 2 miles; Grängesberg-Oxelösund, 0.4 mile; Stockholm-Roslagen, 7 miles; and Stockholm-Saltsjön, 1 mile.

Electrification.—In July 1945 the following lines were electrified as indicated: Bergslagerna, 226 miles; Dalsland, 40 miles; Gävle-Dala, 57 miles; Mellersta Östergötland, 45 miles; Nordmark-Klarälven, 103 miles; Stockholm-Roslagen, 37 miles; and Stockholm-Saltsjön, 11 miles.

Local Transit System

At least four Swedish cities have local transit systems. Data on the street railways of Stockholm, Göteborg, Jönköping, and Malmö are given below as they were received from the American Legation in Stockholm.

AKTIEBOLAGET STOCKHOLMS SPARVÄGAR (**The Stockholm Street Railway Co.**)—**Ownership.**—Practically all the shares in the AB. Stockholm Sparvägar are owned by the city of Stockholm. The company is thus in reality a public enterprise.

Length of lines (Dec. 31, 1943).—Streetcar track length in use, 87 miles; bus line length, 87 miles; trolley bus line length, 11 miles.

Passengers carried (1943).—Streetcars, 173,990,197; buses, 33,347,237; trolley buses, 18,734,283; total passengers carried, 226,071,717.

Amount of electricity consumed (1943).—Streetcars, 39,290,000 kwh; trolley buses, 3,310,000 kwh.

Streetcar traffic (1943).—Length of lines in use, 87 miles; average number of passengers carried per day, 448,274; average daily income, 110,706 kronor; average income per passenger, 0.24 kronor.

Night traffic (1943).—Length of lines in use, 72 miles; average number of passengers carried per night, 5,925; average nightly income, 3,893 kronor; average income per passenger, 0.51 kronor.

Streetcar traffic within city limits (1943).—Length of lines, 47 miles day, 31 miles night; total passengers carried, 127,143,122, day, 1,571,238, night; passengers per day or night, 350,305 day 4,317 night; income per day or night, 75,531 kr. day, 1,840 kr. night; income per passenger, 21.5 kr. day, 42.6 kr. night.

Streetcar traffic on suburban lines (1943).—Length of lines, 41 miles day, 41 miles night; total passengers carried, 35,759,000 day, 519,724 night; passengers per day or night, 97,969 day, 1,608 night; income per day or night 35,175 kr. day, 2,053 kr. night; income per passenger, 0.36 kr. day, 0.78 kr. night.

Bus traffic (1943).—Busses carried a total of 46,924,021 passengers. Of these 32,784,628 were carried on suburban lines and 14,139,393 were carried on lines within city limits.

Fares.—Streetcar fares within city limits are 20 öre (approximately 5 cents) per trip. Transfers from one line to a second within city limits cost 30 öre. Trolley busses within city limits charge 25 öre per trip. Double fares are charged on all streetcar and bus lines between 12 midnight and the time the morning schedule for the line goes into effect.

Fares on streetcars and busses outside city limits vary according to the distance traveled.

Income (kronor) (1943).—From streetcar traffic, 42,152,272; from bus traffic, 9,481,124; from trolley bus traffic, 4,479,220; other, 80,141; total, 56,192,759.

Expenses (kronor) (1943)—For streetcar traffic, 41,887,829; for bus

Digitized by Google

TABLE 6.—*Private Railways*[1]—*Equipment, December 31, 1944*

Railway	Motive power units	Passenger cars (including combination)	Total Seats	Baggage and freight cars	Total capacity (metric tons)
Askersund-Skyllberg-Lerbäck	5	4	101	69	675
Bergslagerna	140	180	8,932	2,787	53,675
Byvalla-Långshyttan	5	3	145	154	1,319
Dal-Västra Värmland [2]					
Dala-Ockelbo-Norrsundet	14	10	225	307	3,155
Dalsland	10	11	727	119	1,650
Dannemora-Harg	9	4	179	223	3,216
Gotland	12	18	760	275	2,396
Grängesberg-Oxelösund	105	76	4,287	2,457	61,092
Gävle-Dala	64	58	3,008	1,951	37,034
Göteborg-Särö	5	16	1,174	23	255
Halmstad-Bolmen	8	13	505	106	1,326
Hjo-Stenstorp	10	[3] 12	455	140	1,398
Hällefors-Fredriksberg	6	6	185	206	1,833
Kinnekulle-Lidköping [4]					
Kil-Fryksdalen [2]					
Klintehamn-Roma	5	4	131	79	571
Krylbo-Norberg	3	3	98	67	858
Köping-Uttersberg-Riddarhyttan	7	12	370	351	5,185
Lidköping-Håkantorp	13	18	715	197	2,167
Lidköping-Skövde och Stenstorp	8	17	643	143	1,456
Ljungbyholm-Karlslunda	1	1	33	36	329
Lödöse-Lilla Edet [2]					
Malmö-Genarp	3	5	314	112	1,415
Mariestad-Moholm	1	4	169	33	361
Mellersta-Östergötland	25	[3] 41	1,549	391	3,677
Nora Bergslag	23	20	990	562	10,365
Nordmark-Klarälven	22	[5] 23	968	797	9,103
Norra Östergötland	25	[5] 25	1,123	479	5,036
Norrköping-Söderköping-Vikbolandet	17	[5] 32	1,361	243	2,364
Norsholm-Västervik-Hultsfred	32	44	1,557	669	5,807
Slite-Roma	3	3	92	58	405
Stockholm-Nynäs	14	28	2,341	63	911
Stockholm-Roslagen	49	119	6,839	637	8,417
Stockholm-Saltsjön	11	20	1,550	43	522
Södra Dalarne	15	29	1,493	341	5,675
Trollhättan-Nossebro [6]					
Västergötland-Göteborg	37	85	3,907	884	9,553
Ängelholm-Klippan [7]					
Öland	23	25	884	284	2,485

[1] Including only those railways privately operated on March 31, 1946.
[2] Uses Bergslagerna equipment.
[3] Also two mail cars.
[4] Uses Lidköping-Håkantorp equipment.
[5] Also one mail car.
[6] Uses Västergötland-Göteborg equipment.
[7] Uses State Railways equipment.

TABLE 7.—*Private Railways*[1]—*Traffic, 1944*

Railway	Thousands of passengers	Thousand metric tons of freight
Askersund-Skyllberg-Lerbäck	.....	32.4
Bergslagerna	4,100.0	3,553.8
Byvalla-Långshyttan	124.2	143.3
Dal-Västra Värmland	473.9	222.1
Dala-Ockelbo-Norrsundet	17.1	328.0
Dalsland	274.2	224.7
Dannemora-Harg	147.3	231.2
Gotland	572.7	159.9
Grängesberg-Oxelösund	2,299.2	2,702.1
Gävle-Dala	1,874.5	2,077.9
Göteborg-Särö	910.2	1.6
Halmstad-Bolmen	107.9	61.8
Hjo-Stenstorp	186.9	46.1
Hallefors-Fredriksberg	10.0	91.7
Kinnekulle-Lidköping	145.9	123.7
Kil-Fryksdalen	328.5	209.3
Klintehamn-Roma	69.1	33.5
Krylbo-Norberg	5.5	189.1
Köping-Uttersberg-Riddarhyttan	151.0	138.7
Lidköping-Håkantorp	201.0	92.4
Lidköping-Skövde och Stenstorp	685.8	84.7
Ljungbyholm-Karlslunda	43.7	8.8
Lödöse-Lilla Edet	216.9	49.3
Malmö-Genarp	113.2	68.8
Mariestad-Moholm	1,161.3	5.1
Mellersta Östergötland	49.0	197.2
Nora Bergslag	352.0	615.5
Nordmark-Klarälven	654.3	558.8
Norra Östergötland	710.3	408.2
Norrköping-Söderköping-Vikbolandet	817.6	101.9
Norsholm-Västervik-Hultsfred	635.9	264.1
Slite-Roma	47.7	46.5
Stockholm-Nynäs	1,453.3	195.9
Stockholm-Roslagen	8,386.9	346.2
Stockholm-Saltsjön	3,541.0	68.8
Södra Dalarne	941.8	637.3
Trollhättan-Nossebro	128.0	42.1
Västergötland-Göteborg	1,611.4	498.4
Ängelholm-Klippan	156.7	27.4
Oland	199.2	117.2

[1] Including only those railways privately operated on March 31, 1946.

traffic, 12,058,095; for trolley bus traffic, 2,223,076.

Excess of income over expenses (1943).—23,758 kronor.

Capital stock (1943).—31,500,000 kronor.

New equipment.—According to the Stockholm press, Mr. T. ASTRÖM, Director of the Stockholm Street Railway Co., outlined in a speech before the annual meeting of the Swedish Local Traffic Association on September 5, 1945, a 10-year plan drawn up by the Street Railway Co., involving the construction of new streetcar and trolley bus lines, depots, and a central workshop costing an estimated total of Kr. 65,000,000. The company also plans to purchase the following items of rolling stock over the next 10 years: 100 streetcars, 350 busses, 300 trolley busses, and 350 subway cars.

Of this amount, 100 streetcars, 110 busses, and 50 trolley busses are already under construction and orders are expected to be placed soon for an additional 100 busses and 60 trolley busses. Factories have been asked to submit offers for 70 subway cars. The total purchasing program is expected to cost approximately Kr. 120,000,000.

Vehicles owned (Dec. 31, 1943).—Streetcars with motors, 299; trailers, 396; other, 142; busses, 280; trolley busses, 70; total vehicles, 1,187. In Stockholm, streetcars are run in trains of two or three cars; the first having a power unit and the others as trailers without power units.

Employees (Dec. 31, 1943).—Streetcar section, 3,291; busses and trolley busses, 1,479; total employees, 4,770.

Jonkopings Kommunala Affarsverk

Address. — Jönköpings Kommunala Affärsverk, Jönköping.

Total length of street railway lines.—7 miles.

Total length of bus lines.—14 miles.

Number of passengers in 1944.—Street railway traffic, 4,728,327; bus traffic, 284,643.

Income from fares.—Street railway traffic, Kr. 959,110.44; bus traffic, Kr. 60,371.90.

Other income.—Street railway traffic, Kr. 10,727.55.

Cost of operation in 1944 (including interest paid and sums written off).—Street railway operation, Kr. 742,542.33; bus traffic, Kr. 93,078.38.

Number and types of streetcars and busses. — 12 ASEA streetcars — normal capacity, 28 passengers; 6 ASEA cars—normal capacity, 36 passengers; 10 ASEA cars—normal capacity, 36 passengers; 3 Volvo busses—normal capacity, 25, 31, and 39 passengers, respectively; 1 International bus—normal capacity, 26 passengers; 1 Reo bus—normal capacity, 27 passengers; 1 Dodge bus—normal capacity, 23 passengers; 2 Chevrolet busses—normal capacity, 20 passengers.

Types of motors.—18 ASEA motors of 20 hp each, 6 ASEA motors of 30 hp each, 10 ASEA motors of 35 hp each, 3 AEG motors of 40 hp each, 18 AEG motors of 25 hp each.

Voltage used.—550-580.

Number of employees.—Street railways, 77; busses, 6; office, 4.

Shops.—The company maintains its own repair shops using Swedish material almost exclusively.

Digitized by Google

TABLE 8.—*Private Railways*[1]*—Income and Expenditures in Kronor, 1944*

Railway	Income	Expenditures	Profit
Askersund-Skyllberg-Lerbäck	32,429	32,279	150
Bergslagerna	11,832,483	9,458,355	2,374,128
Byvalla-Långshyttan	36,000	36,000	.....
Dal-Västra Värmland	537,761	537,761	.....
Dala-Ockelbo-Norrsundet	118,182	118,182	.....
Dalsland	619,080	609,837	9,243
Dannemora-Harg	297,453	282,453	15,000
Gotland	203,843	128,327	75,516
Grängesberg-Oxelösund	4,033,851	3,134,530	899,321
Gävle-Dala	4,150,943	2,755,956	1,394,987
Göteborg-Särö	116,479	116,479	.....
Halmstad-Bolmen	74,171	69,616	4,555
Hjo-Stenstorp	62,967	61,912	1,055
Hällefors-Fredriksberg	50,869	49,167	1,702
Kinnekulle-Lidköping	12,273	12,185	88
Kil-Fryksdalen	824,224	714,928	109,296
Klintehamn-Roma	30,151	30,245	—94
Krylbo-Norberg	53,566	45,437	8,129
Köping-Uttersberg-Riddarhyttan	78,660	62,151	16,509
Lidköping-Håkantorp	82,993	81,596	1,397
Lidköping-Skövde och Stenstorp	107,244	78,767	28,477
Ljungbyholm-Karlslunda	50,856	53,458	-2,602
Lödöse-Lilla Edet	46,200	42,738	3,471
Malmö-Genarp	19,752	17,215	2,537
Mariestad-Moholm	19,983	14,904	5,079
Mellersta Östergötland	302,968	268,320	34,648
Nora Bergslag	947,337	855,434	91,903
Nordmark-Klarälven	770,858	738,714	32,144
Norra Östergötland	490,263	344,323	145,940
Norrköping-Söderköping-Vikbolandet	339,075	240,103	98,972
Norsholm-Västervik-Hultsfred	506,645	484,894	21,751
Slite-Roma	45,767	37,574	8,193
Stockholm-Nynäs	520,973	328,191	192,782
Stockholm-Roslagen	2,619,438	2,396,751	222,687
Stockholm-Saltsjön	1,108,193	857,713	250,480
Södra Dalarne	877,609	584,683	292,926
Trollhättan-Nossebro	16,009	14,259	1,750
Västergötland-Göteborg	734,839	574,785	160,054
Ängelholm-Klippan	74,721	74,721	.....
Öland	277,636	277,636	.....

[1] Including only those railways privately operated on March 31, 1946.

The company's workshops merely repair and rebuild bodies and chassis. Boring of motors and rotor windings are done by a special workshop.

All streetcars are of Swedish manufacture.

Goteborgs Sparvagar

Address. — Göteborgs Spårvägar, Göteborg.

Total length of street railway lines.—46 miles.

Private Railways[1]*—Employees, Average in 1944*

Railway	*Number of Employees*
Askersund-Skyllberg-Lerbäck	22
Bergslagerna	3,099
Byvalla-Långshyttan	66
Dal-Västra Värmland	278
Dala-Ockelbo-Norrsundet	144
Dalsland	159
Dannemora-Harg	94
Gotland	258
Grängesberg-Oxelösund	1,329
Gävle-Dala	1,339
Göteborg-Särö	71
Halmstad-Bolmen	65
Hjo-Stenstorp	91
Hällefors-Fredriksberg	47
Kinnekulle-Lidköping	45
Kil-Fryksdalen	141
Klintehamn-Roma	43
Krylbo-Norberg	25
Köping-Uttersberg-Riddarhyttan	89
Lidköping-Håkantorp	137
Lidköping-Skövde och Stenstorp	115
Ljungbyholm-Karlslunda	15
Lödöse-Lilla Edet	17
Malmö-Genarp	35
Mariestad-Moholm	28
Mellersta Östergötland	268
Nora Bergslag	361
Nordmark-Klarälven	389
Norra Östergötland	306
Norrköping-Söderköping-Vikbolandet	251
Norsholm-Västervik-Hultsfred	406
Slite-Roma	31
Stockholm-Nynäs	200
Stockholm-Roslagen	849
Stockholm-Saltsjön	162
Södra Dalarne	320
Trollhättan-Nossebro	29
Västergötland-Göteborg	693
Ängelholm-Klippan	23
Öland	146

[1] Including only those railways privately operated on March 31, 1946.

Total length of bus lines.—28 miles.

Number of passengers (1944). — Streetcars, 81,746,492; busses, 11,995,655; total, 93,742,147. If the number of trips made by season-ticket holders—estimated for 1944 at 1,232,616—is added, the total number of passengers carried for this period is 94,974,763.

Fares (1944). — Streetcars, Kr. 15,971,855.30; busses, Kr. 2,398,350.85; total Kr. 18,370,206.15.

Other income.—Seasonal tickets, Kr. 228,527.09, hired cars, Kr. 17,132.92; baggage charges, Kr. 16,509.45; miscellaneous income, Kr. 30,964.04; total, Kr. 293,133.50.

Cost of operation in 1944 (including interest paid and sums written off).—Streetcars, Kr. 11,574,344.43; busses, Kr. 2,835,637.24; total, Kr. 14,409,981.67.

Equipment (1944). — 167 motorcars, with capacity of 10,239 (including standing room); 146 trailers, with capacity of 8,195 (including standing room); 2 freight cars; 3 work cars; 137 busses, with capacity of 7,883 (including standing room).

Bus motors.—Scania Vabis 6-cylinder Diesel, 120 hp at 2,000 rpm; Volvo 6-cylinder Hesselman, 120 hp at 2,800 rpm.

Trolley-bus motors.—ASEA LJB 28, 85 kw, 1,180 rpm, 600 volt.

Current.—600 volt DC.

Streetcar motors:

	Kw	*Rpm*	*Volts*
Swedish: ASEA B 104	29.5	435	550
BMW 113	45.0	550	550
LJ 32	47.0	550	550
LJB 24	40.0	1,000	550/2
German: AEG U 158	29.5	435	550
US 521	40.0	430	550
US 351	37.5	560	550
US 341-341a	35.0	580	550
USL 203	55.0	1,100	550/2

Number of employees (Sept. 10, 1945).—Office personnel, 67; inspectors, foremen, shed superintendent, 56; streetcar traffic personnel, 1,116; bus traffic personnel, 137; shed and workshop personnel, 350; track and cable personnel, 120; total, 1,846.

Shops.—The company maintains its own repair shops. Street railway rails are normally purchased abroad as are certain minor accessories such as switches and intersection material. Streetcars, busses, and motor units are, as a rule, constructed at other than the company's workshops. However, the company does build trailer cars to some extent in its own shops.

Malmo Stads Sparvagar

Address. — Malmö Stads Spårvägar, Zenithsgatan 10 A, Malmö.

Ownership.—Municipally owned.

Total length of track.—Street railways, 15 miles; busses, 27 miles.

Number of passengers (1944).—Exclusive of transfers, 27,702,680; inclusive of transfers, 34,037,044.

Operating revenues in 1944 (from bus and street railway operations only).—Kr. 4,957,718.

Other income.—Kr. 70,585, including transport of parcels.

Expenses (1944).—Kr. 4,453,130 (including amount written off and 5 percent interest on bookkeeping value, totaling Kr. 503,870).

Capital invested in plant, rolling stock, and immovable property.—Kr. 10,836,569.

Book value of total capital invested in the company (December 31, 1944).—Kr. 1,998,308.

Rolling stock (motor and trailer cars).—64 motorcars, 35 trailer cars, and 45 omnibusses (all operated by charcoal-gas).

Power.—550 volts DC.

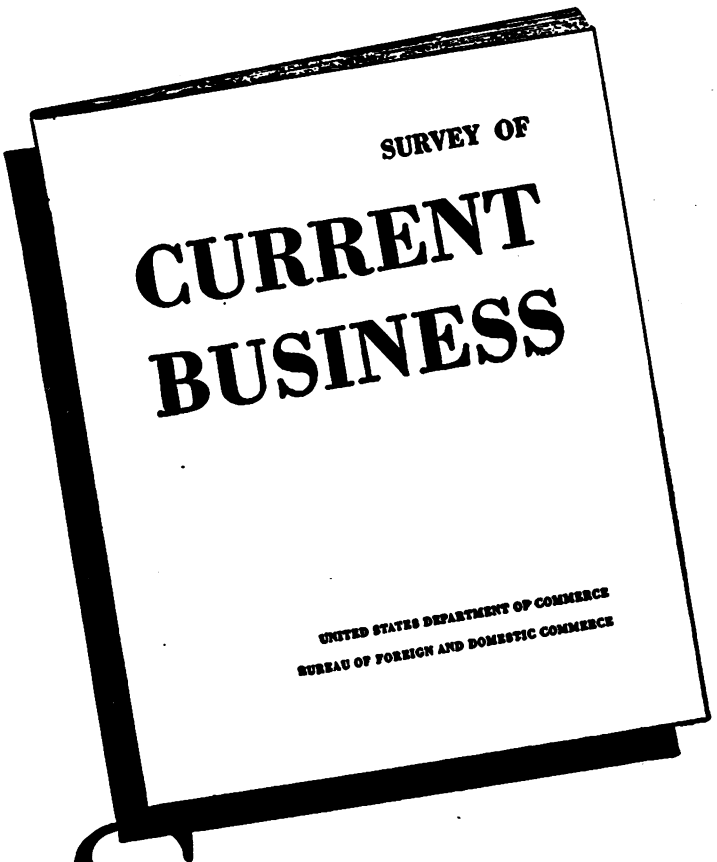
Contact.—Overhead trolley.

Employment.—Street railway workers (all Swedish)—Officials, 43; traffic personnel, 318; other personnel, 183; total, 544.

Repair shops.—Import mainly rails and switches as well as diverse electrical materials. The company does not build complete units.

★ U. S. GOVERNMENT PRINTING OFFICE: 1946—707802—213

Digitized by Google



$2.00
per year

SURVEY OF CURRENT BUSINESS

THIS AUTHORITATIVE MONTHLY PERIODICAL makes easily available to businessmen over 2,200 comprehensive facts about production, stocks, orders, prices, sales, shipments, etc., of the industries of the United States by means of text, tables, charts, and index numbers.

A sample copy will be sent, on request to the
Bureau of Foreign and Domestic Commerce,
Washington, D. C.

$2.00 per year, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Digitized by Google

A New Service

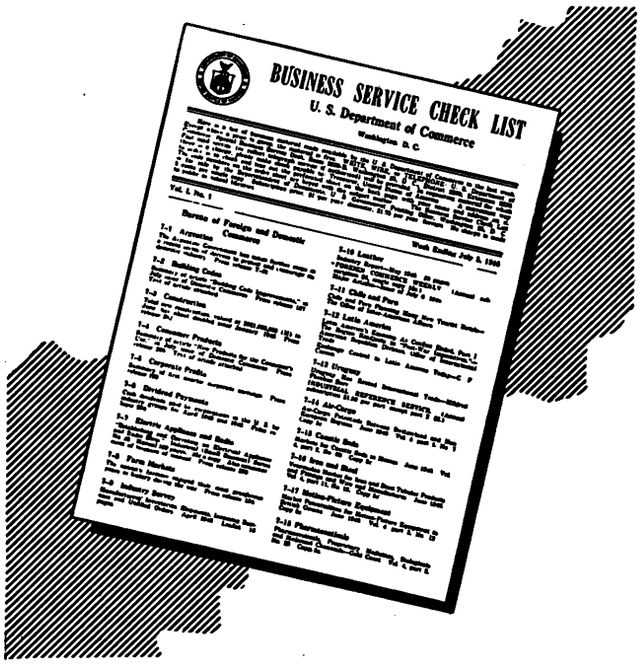
by the U. S. DEPARTMENT OF COMMERCE

BUSINESS SERVICE CHECK LIST

The U. S. Department of Commerce itemizes all news releases, publications, speeches, pamphlets, and books published the previous week in its weekly Business Service Check List. This listing will enable you to order the material that will be of specific aid to you in your business.

Typical of the listed material that will interest you are marketing data, articles on specific industries and business, foreign markets, establishing and operating numerous kinds of small businesses, and foreign industrial wartime secrets.

Many of the items in the BUSINESS SERVICE CHECK LIST are free.



The listing covers these Bureaus and Offices:

Census Bureau
Civil Aeronautics Administration
Coast and Geodetic Survey
Foreign Trade Zones Board
National Bureau of Standards
Office of Business Economics
Office of Domestic Commerce
Office of International Trade
Office of Small Business
Office of Technical Services
Patent Office
Weather Bureau

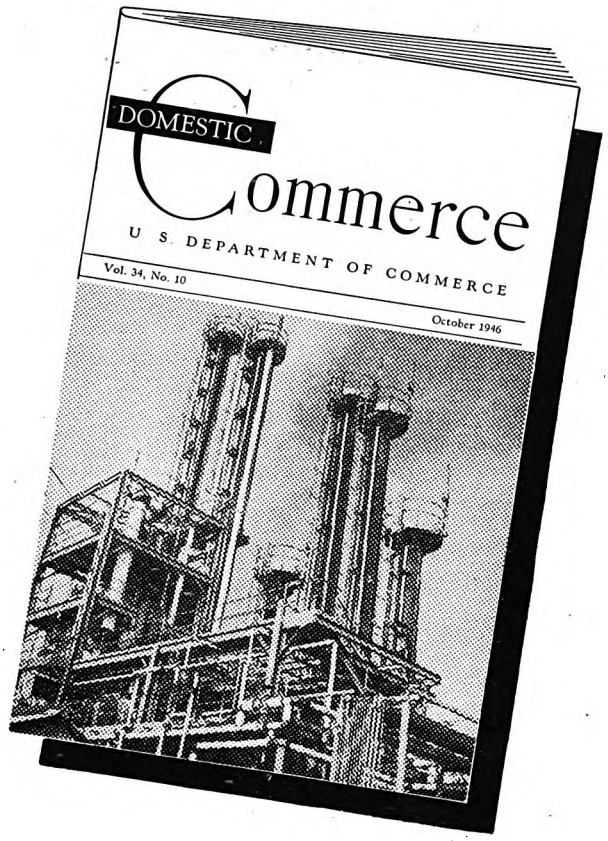
Annual subscription **$1** *A sample copy will be sent on request.*

Order today from the

Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

Digitized by Google

Every Businessman Could Profit by Reading . . .



Pocket Size

DOMESTIC COMMERCE

96 Pages of Facts and Ideas!

- Timely news on problems that face businessmen today.
- Marketing information on numerous business activities.
- Economic surveys and trends.
- New products being designed for consumer use.
- Progress and changing conditions of industry and business.
- Monthly listing of all business service material published by the U. S. Department of Commerce.
- What's New—a regular feature on patents dedicated for public use, and new and abandoned patents.

These are typical of the material currently appearing. Articles written by specialists in the U. S. Department of Commerce as well as those of other governmental agencies.

Annual Subscription $1

Order today from the
Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

(Make check payable to Treasurer, U. S. A.)

Digitized by Google

Documents Room

Industrial Reference Service

U. S. DEPARTMENT OF COMMERCE, W. AVERELL HARRIMAN, *Secretary*

Office of International Trade, ARTHUR PAUL, *Director*

Part 1. TRANSPORTATION and PUBLIC UTILITIES

INDIANA UNIVERSITY FEB 22 1947 LIBRARY

Available in Parts Covering Selected Services and Commodities

Annual Subscription $1.50. Price this report 5 cents

For sale by the Superintendent of Documents, Government Printing Office, Washington 25, D. C., or any of the Department's Field Offices

Volume 4—Part 1 D 18131 December 1946 Number 32

Electric Power in India

By Guida Berrigan Hall, Transportation and Communications Division, Special Services and Intelligence Branch

Based on United States Foreign Service Reports, Official Indian Documents, and other Sources

Steady and continued progress has been made in the electrification of India, and the importance of hydroelectric power to industry has contributed greatly to this development. Inasmuch as the water fall of India is mostly seasonal, dams on the rivers for both irrigation projects and hydroelectric generation have proven advantageous.

Almost 30 years ago the Government of India, acting upon the advice of India's Industrial Commission, made a hydroelectric survey, which showed a potential of 5,500,000 kilowatts for the country, of which about 50,000 kilowatts were utilized at that time.

Hydroelectric plants have materially increased in number throughout India especially during the past decade. At the present time many such plants are in various stages of construction, while others are still at the "paper" stage.

A full discussion of all of the schemes now in existence in India is far beyond the scope of this report, and only the highlights of some of the larger projects are described.

While irrigation projects have been undertaken in India for hundreds of years, it was only at the turn of the century that the first hydroelectric generating station was constructed. This plant, with a capacity of 6,000 kilowatts was located in Mysore State. The second Indian state to develop its hydrolectric resources was Kashmir, after which Chamba, Travancore, Hyderabad, and Gwalior followed with similar plants. In Kashmir, industry receives electric energy from the hydroelectric central at Baramulla, which generates 20,000 kilowatts. Irrigation projects, in most cases, have been associated with hydroelectric development.

The States of Gwalior, Indore, Jaipur, Udaipur, and Katah have entered into an agreement to harness the Chambal River for the development of electric energy. Hydroelectric generating stations are also being constructed in the States of Cochin, Mayurbhanj, Bundi, Basnai, Kalahandi, Patna, and Matni, by the individual state or by two or more states acting cooperatively. Sirmur State plans to construct dams on the Tons, and Giri Rivers in cooperation with the Punjab and United Provinces.

One of the smaller states, Mandi, has also kept pace in the development of its hydroelectric resources, and is able to supply electricity for domestic and commercial purposes to the central and eastern parts of the Punjab.

One of the first uses to which electric power was put in India was that of working the Kolar gold mines, which are recognized to be the oldest, deepest, and among the most important gold mines in the world. The electric energy, which is generated more than 92 miles away, helps to mine gold from quartz more than 8,000 feet below the surface of the earth.

Sone Valley Hydroelectric Plans

Extensive plans are being formulated for the development of one of the largest irrigation and hydroelectric projects in India by the construction of dams on the Rihand River, which borders Rewa State and the United Provinces. The Rihand River is a tributary of the Sone River, which in turn is a tributary of the Ganges. The main dam, which is expected to generate over 50,000 kilowatts of electricity, is to be located on the Rihand River. It will be 300 feet high and constructed entirely of stone, with a capacity of 90 million acre feet.

A second embankment, to be known as the Obra dam, will be located 16 miles below the Rihand dam, and catch the fall from that source, thereby supplying an additional 52,000 kilowatts of uninterrupted constant energy. The construction of a third dam on the Sone River in Rewa State has also been proposed. It is believed construction of these dams will start in about two years.

Bakhra Dam and Electric Plant

Bakhra Dam, on the Sutlej River (Punjab), when completed, is expected to be the highest dam in the world. It will reach a height of 480 feet, and have a storage capacity of 4⅓ million acres feet of water. This project will provide irrigation for the areas of Hissar, Rohtak, Karnal, and the adjoining Punjab States, where industry in that locality will be encouraged by the 160,000 kilowatts of electricity which will be generated at the hydroelectric plant at the site of the dam.

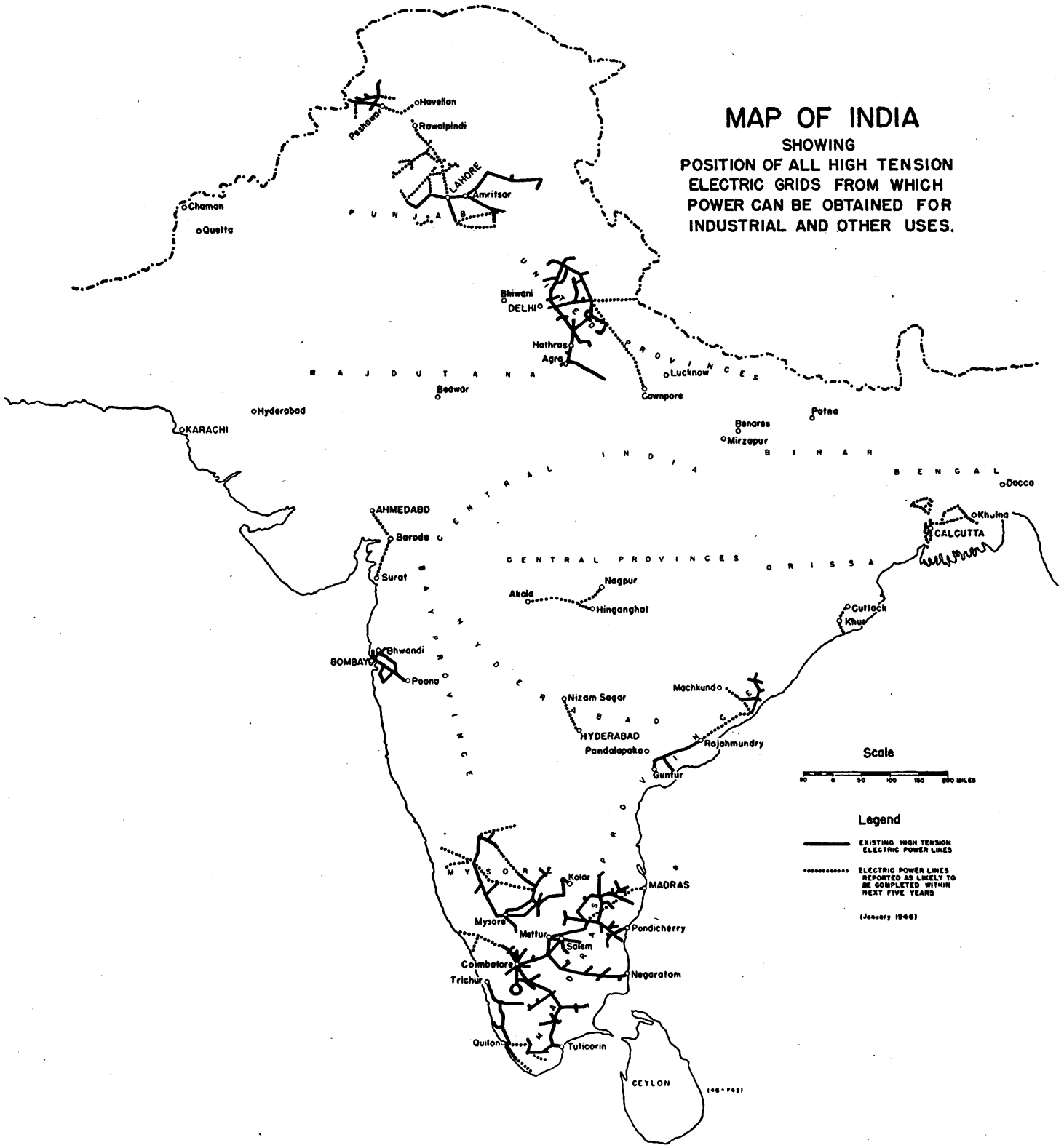
Godavari Valley Development

The Godavari Valley Development Scheme is a state-sponsored project to develop an area in Hyderabad (where the Government proposes to establish a modern city), is designed to provide electric power on a large scale.

Over 432 miles of the 675-mile Godavari River lie wholly within the State of Hyderabad, and the river forms the state's boundary for 106 miles. At a point on this river a thermal plant is to be built, followed by the construction of hydroelectric and irrigation plants. It is expected that this location will be the center of a large industrial area, and by the combination of the thermal and hydraulic power projects, the valley will have the advantage of a flexible power system which will be more economical and reliable than if only one type of power generation was adopted.

It is planned to produce 120,000 kilowatts in the thermal plant in addition

Digitized by Google



Digitized by Google

to which a considerable amount of hydroelectric energy will also have to be generated separately to supply the contemplated new industries.

So far only the possibilities of the upper Godavari dam have been investigated, and from which generation a continuous supply of 55,000 kilowatts is estimated. Investigations are also being made as to the potentialities of hydroelectric generation from the lower Godavari project, and which are believed to exceed those of the upper valley.

The thermal plant will consist of three 12,500 kilowatt units, the first of which will be in operation during the latter part of 1947, and the other two will be ready for operation at intervals of six months each. The plans of the station permit the future addition of three units of 30,000 kilowatt capacity each, so as to give ultimately a combined output of 97,500 kilowatts.

The Government has allotted $2,000,000 for preliminary work on these projects.

Machkund Hydroelectric Project

It is expected that 6 years will be required to complete the proposed Machkund hydroelectric project on the Machkund River at the site of the Doduma Falls. Electric power is expected to be available at the end of 4 years, providing the required machinery can be obtained, as needed.

This project has been made possible after protracted negotiations between the Governments of Madras and Orissa over boundary issues and the ultimate sharing of the electricity which will be developed. The plan consists of harnessing the potential of the Machkund River where it drops 550 feet at Doduma Falls. The river flows chiefly through the Madras Presidency, but the falls lie in Orissa along the Madras-Orissa boundary. The power plant will be located on the Orissa side, and the 105,000 kilowatts which it is expected to develop will benefit the hitherto neglected Andhra region of Madras.

The agreement reached by the Governments of Madras and Orissa is twofold. It provides first, that the power shall be shared equally both in the ultimate and at the intervening individual stages of its development; and second, that the Madras Government may utilize 20 percent of the power in addition to the 50 percent for a period of 99 years subject to the payment of a royalty of Rs. 20 per kilowatts on 20 percent of the actual maximum demand recorded at the power house during each fiscal year.

After a period of 30 years, the second provision is subject to revision. At the end of 99 years, however, the Orissa Government may claim the 20 percent, subject to the payment of the proportionate share of the capital cost incurred by the Madras Government.

The construction and maintenance of the hydroelectric generating plant and the dam will be undertaken by the Madras Government. Each Government will be responsible for the construction, maintenance, and operation of the transmission lines, and distribution systems in their respective territories.

The cost of the project is estimated at Rs. 75,000,000 ($22,500,000), 70 percent of which will be provided by the Madras Government, and the remaining 30 percent by the Orissa Government.

The Government of Orissa has allowed the Madras Government to develop power at two sites on the Sileru River for a period of 99 years. At the end of this period the Government of Orissa will be entitled to claim 50 percent of the total output of the plants upon payment of the proportionate share of the capital cost. The Madras Government will supply power from these two generating stations to the Orissa Government during the 99 year period, on the same terms and conditions under which the Madras consumers receive electricity.

A Joint Board of Control with proper representation from the two governments, based upon the proportion of capital contributed towards the costs of the project, and an advisory committee will handle matters arising in the development of the project.

Pykara-Moyar Electric Expansions

In order to supply the increased demand for electrical energy by the southern areas of the state, the Government of Madras has approved the extension of the distribution system supplied by the Pykara and Moyar power plants. The Moyar plant forms a part of the main Pykara hydroelectric development. An initial estimate of $7,650,000, and $12,390,000 at the end of the tenth year, has been sanctioned by the Government.

The Pykara extensions will provide for a dam across the Pykara river, by means of which 2,000,000,000 cubic feet of water will be stored; a new penstock line, and two additional generating units of 13,500 kilowatts each to be installed at the Pykara power station.

The Moyar expansion provides for the installation of a third generating unit of 12,000 kilowatts at the Moyar power plant.

A recent press article of government origin, states that in view of the recent continued adverse water conditions in the southern part of Madras, the building of the reservoir on the Pykara River will commence immediately. Sufficient storage is expected to be built up by 1948 to enable the full utilization of the existing generating plant. Work on the extensions will be completed by 1950–51, it is announced.

Visit of Indian Industrialists

Two industrialists have been deputed by the Government of Mysore to visit the United States and the United Kingdom to speed up plans for postwar industrial development in connection with the various Mysore electrometallurgical and electrochemical industries. Electric power for the industries is to be supplied by the Jog hydroelectric project. The men will remain abroad six months during which time they will contact interested industrial experts and enterprises.

The Jog hydroelectric station when constructed in 1942, was ordered by the Government to adopt 50 cycle frequency in the generation of power. The balance of the State was also ordered to convert from 25 cycles to 50 cycles before 1950. The Kolar Gold Fields area was the only exception from the conversion to 50 cycles from 25 cycles, and remains at the latter figure.

Electric Supply

The 50 cycle frequency is the one most commonly used throughout India. A large portion of direct current consumption is in use in the areas of Bombay and Calcutta. However, both cities are gradually converting to 50 cycles, and it is noteworthy that all generators in Calcutta are for alternating current. Generally speaking, Indian's domestic supply of electricity is 230 volts, a. c., 3 phase, 50 cycle. The electric current now supplied to the majority of the larger cities in India is given in the following table.

Electric Current Characteristics

City or town	Ownership	Kw.	Consumers' supply				Prime mover
			Type	Phase	Cycle	Voltage	
Abbottabad	Rawalpindi Electric Power Co. Ltd.	177	a. c.	3	50	230/400	Diesel.
Abohar	Abohar Electric Supply Co. Ltd.	290	a. c.	3	50	220/400	Do.
Abu Road	B. B. & C. I. Railway	50	d. c.	1	.....	230/460	Do.
Adilabad	State Power Station	.....	a. c.	3	50	230/400	
Adoni	Adoni Electric Supply Co.	320	a. c.	3	50	230/400	Diesel.
Agra City & Cantt.	Agra Electric Supply Co. Ltd.	3,500	a. c.	3	50	230/400	Steam.
Ahmedabad	Ahmedabad Electricity Co. Ltd.	31,000	a. c.	3	50	230/400	Do.
Ahmednager	Military Engineer Services	255	a. c.	3	50	230/400	Diesel.
Ajmer	Ajmer Electric Supply Co. Ltd.	1,180	a. c.	3	50	230/400	Do.
Do.	B. B. & C. I. Railway	2,150	d. c.	1	.....	230/460	Steam.

Digitized by Google

Electric Current Characteristics — Continued

City or town	Ownership	Kw.	Consumers' supply				Prime mover
			Type	Phase	Cycle	Voltage	
Akalkot	Shri Vijaysingh Electric Supply Co	150	d. c.			440	Diesel.
Akola	Akola Electric Supply Co. Ltd	509	a. c.	3	50	230/400	Do.
Akot	Akot Electric Supply Co	74	a. c.	3	50	230/400	Do.
Aligarh	Aligarh Electric Supply Co. Ltd		a. c.	3	50	230/400	Purchased in bulk.
Allahabad	U. P. Electric Supply Co. Ltd		d. c.			220/400	
Do	do	3,950	a. c.	3	50	230/400	Steam.
Allahabad Fort	Military Engineer Services	108	d. c.			220	Diesel.
Amalner	Amalner Electric Supply Co	320	a. c.	3	50	230/400	Do.
Ambala Cantt	Ambala Electric Supply Co	450	d. c.			220/460	Do.
Do	do	450	d. c.			220/460	Do.
Ambala City	Ambala City Electric Supply Co	420	a. c.	3	50	230/400	Do.
Do	do	420	a. c.	3	50	230/400	Do.
Ambarnath			a. c.	3	50	230/400	
Amboli	Bombay Suburban Electric Co		a. c.	3	50	230/400	
Ambur	Ambur-Vaniyambadi Electric Co	150	a. c.	3	50	230/400	Hydro.
Amraoti	Amraoti Electric Supply Co	354	a. c.	3		230/400	Diesel.
Amreli	Amreli Electric Supply Co	384	d. c.	1		230/460	Do.
Amritsar	Municipal Electricity Department	3,200	d. c.	1		220/440	Steam and bulk.
Do	do	1,000	a. c.	3	50	230/400	Hydro.
Do	North Western Railway	80	a. c.	3	50	230/400	Diesel.
Anakapalle	Anakapalle Electric Supply Co	200	a. c.		50	230/400	Purchased in bulk.
Anand	Anand Electric Supply Co	156	a. c.	3	50	230/400	Diesel.
Anantapur			a. c.	3	50	250/440	
Andheri	Andhra Valley Power Supply Co. Ltd		a. c.	3	50	230/400	Hydro.
Arcot			a. c.	3	50	230/400	
Ariadaha	Calcutta Electric Supply Corp. Ltd		a. c.	3	50	230/400	
Arrah	Arrah Electric Supply Co. Ltd	342	3w - d. c.			230/460	Diesel.
Aruvankadu	Madras Government Cordite Factory		a. c.	3	50	220/350	Purchased in bulk.
Asansol	Asansol Electric Supply Co		a. c.	1-2-3	50	230/400	Do.
Ashram Road	Ahmedabad Electricity Co. Ltd		a. c.	3	50	230/400	Do.
Attock Fort	Military Engineer Services, Northern Command	10	d. c.			200	
Aurangabad	State Power Station	315	a. c.	3	50	230/400	Diesel.
Bagalkot			a. c.	3	50	230/400	
Bahraich			a. c.		50	230/400	
Baidyabati	Calcutta Electric Supply Corp. Ltd		a. c.	3	50	230/400	Steam.
Bally	do		a. c.	3	50	230/400	Do.
Balrampur			a. c.	3	50	230/400	
Bandikui	B. B. & C. I. Railway	80	d. c.			230/460	Diesel.
Bandra	Andhra Valley Power Supply Co		a. c.	3	50	230/400	Hydro.
Bangalore	Government of Mysore		a. c.	3	60	110/220	Do.
Bankura	Bankura Electric Supply Co	144	a. c.	3	50	230/400	Steam.
Bannu	Bannu Electric Supply Co	420	d. c.			230/460	Diesel.
Do	Military Engineer Services	160	d. c.			220/440	Do.
Bansberia	Bansberia Electric Supply Co		a. c.	3	50	230/440	Purchased in bulk.
Barakar			a. c.	3	50	230/400	
Baramati	Baramati Electric Supply Co	64	3w - d. c.			230/460	Diesel.
Baranagar	Calcutta Electric Supply Corp. Ltd	120	a. c.	3	50	230/400	Do.
Bardez	Bardez Electric Supply Co	210	a. c.			230/400	Do.
Bareilly	Bareilly Electric Supply Co. Ltd	1,385	d. c.			220/440	Do.
Do	Military Engineer Services, Eastern Command	185	d. c.			230/440	Steam.
Barisal	Barisal Electric Supply Co	160	a. c.	3	50	230/400	Diesel.
Barnagar (Indore)	Barnagar Electric Supply & Industrial Co	120	a. c.	3	50	240/420	Do.
Baroda	State Electric Power House	2,000	a. c.	3	40	110/220	Do.
			d. c.			110/220	Do.
Barog	North Western Railway	5	a. c.	3	50	230/400	Do.
Barrackpore	Barrackpore Electric Supply Co. Ltd	276	d. c.			220/440	Do.
Barsi			a. c.		50	230	
Bassein	Bassein Electric Supply Co	96	a. c.	3	50	230/440	Diesel.
Batala			a. c.	3	50	230/400	
Belagola	Government of Mysore		a. c.	3	25	230	Hydro.
Belgaum	Amalgamated Electricity Co. Ltd	524	a. c.	3	50	230/400	Diesel.
Bellary	Bellary Municipality	273	a. c.		50	230/400	Do.
			d. c.			230/460	Steam.
Benares	Benares Electric Light & Power Co	3,000	a. c.	3	50	230/400	Do.
Do	Military Engineer Services, Eastern Command	60	d. c.			220	Diesel.
Benares State—	Benares State	132	d. c.				Do.
Berhampur (Bengal)	Berhampur Electric Supply Co. Ltd	124	d. c.			220/440	Do.
Berhampur (Ganjam)	Berhampur Electric Supply Corp	392	a. c.	3	50	230/400	Do.
Berhampur (Ganjam)	do	392	a. c.	3	50	230/400	Do.
Bettiah	Bettiah State Raj	80	d. c.			220/440	Do.
Bezwada	Bezwada Municipality	263	a. c.	3	50	230/400	Do.
Bhadravati	Government of Mysore		a. c.	3	25	230	Purchased in bulk.
Bhagalpur	Bhagalpur Electric Supply Co. Ltd	900	a. c.	3	50	220/350	Diesel.
Do			a. c.	3	50	230/400	
Bhatinda	North Western Railway	80	a. c.	3	50	230/400	Diesel.
Bhatpara	Calcutta Electric Supply Corp. Ltd		a. c.	3	50	230/400	Steam.
Bhavnagar	Bhavnagar State	525	a. c.	3	50	230/400	Do.
Bhiwani	Rohtak & Hissar Dts. Electric Supply Co	300	a. c.	3	50	230/400	Diesel.
Bhopal	Bhopal Electric Supply Co	1,100	a. c.	3	50	230/400	Steam.
Bhusawal	Bhusawal Electric Supply Co	125	a. c.	3	50	230/440	Purchased in bulk.
Bijapur	Bijapur Electric Supply Co	203	3w - d. c.			220/440	Diesel.
Bijnor	Upper Ganges Valley Electric Supply Co		a. c.	3	50	230/400	Purchased in bulk.
Bikaner	Bikaner State Power House	4,000	a. c.	3	50	230/400	Steam.
Bilaspur			a. c.	3	50	220/400	
Bindhachal			a. c.	3	50	230/400	Do.
Bobbili	Bobbili Electric Supply Co		a. c.	3	50	230/400	Purchased in bulk.
Bodinaikanur	Kanan Devan Hills Produce Co	70	a. c.	1 and 3	50	230/400	Do.
Bombay	Bombay Electric Supply & Tramways Co. Ltd		a. c.	3	50	230/400	
			[1] d. c.			230/460	

[1] The generators are a. c., but d. c. distribution is effected by means of convertors.

Digitized by Google

Electric Current Characteristics — Continued

City or town	Ownership	Kw.	Consumers' supply				Prime mover
			Type	Phase	Cycle	Voltage	
Borivli	.....	.....	a. c.	3	50	230/400	
Bowringpet	Government of Mysore	.....	a. c.	3	60	110/220	
Broach	Broach Electric Supply & Development Corp.	752	a. c.	3	50	250/440	Diesel.
Budaun	Budaun Electric Supply Co. Ltd.	.....	a. c.	3	50	230/400	Do.
Bulandshahr	Lower Ganges Jumna Valley Electric Distributing Co.	.....	a. c.	3	50	230/400	Purchased in bulk.
Bulsar	Ahmedabad Electric (Belgaum) Ltd.	296	a. c.	3	50	230/400	Diesel.
Bundi	Bundi Electric Supply Co.	190	a. c.	3	50	230/400	Do.
Burdwan	Burdwan Electric Supply Co.	400	a. c.	3	50	230/400	Steam.
Burhanpur (CP)	Burhanpur Electric Supply & Trading Co.	230	a. c.	3	50	230/400	Diesel.
Calcutta	Calcutta Electric Supply Corp. Ltd.	203,750	[2]a. c.	3	50	230/400	Steam.
			d. c.		.....	225/450	Do.
Calicut	West Coast Electric Supply Corp.	820	a. c.	3	50	230/400	Diesel and gas.
Do.	Military Engineer Services, Southern Command	22	d. c.		.....	220	Diesel.
Cambay	Cambay Electric Supply & Industrial Co.	400	d. c.		.....	230/460	Do.
Campbellpore	Municipal Committee	.....	d. c.		.....	220/440	Do.
Do.	Military Engineer Services, Northern Command	120	d. c.		.....	220/440	Do.
Cannanore	Malabar Electric Co.	500	a. c.	3	50	230/400	Steam.
Cawnpore	Cawnpore Electric Supply Corp.	49,500	a. c.	3	50	230/400	Do.
			d. c.		.....	225/450	Do.
Chaba	Simla (Pubjab) Municipality	1,750	a. c.	3	50	220/380	Hydro and diesel.
Chakwal	Chakwal Electric Supply Co.	75	a. c.		50	230/400	Diesel.
Chalisgaon	Chalisgaon Electric Supply Co.	180	a. c.		50	230/400	Do.
Chaman	Chaman Electric Supply Co.	54	d. c.		.....	240/480	Do.
Chanda	Chanda Electric Supply Co. Ltd.	343	d. c.		.....	242/420	Steam and diesel.
Chandpur	Chandpur Electric Supply Co.	158	a. c.	3	50	230/400	Diesel.
Chapra	Chapra Electric Supply Co. Ltd.	200	a. c.	3	50	230/400	Do.
Chennapatna	Government of Mysore	.....	a. c.	3	25	230	Hydro.
Chhindwara	Chhindwara Electric Supply Co.	120	a. c.	3	50	230/400	Diesel.
Chicacole	Chicacole Electric Supply Corp.	212	a. c.	1 and 3	50	230/400	Do.
Chidambaran	South Arcot Electric Supply Co.	.....	a. c.	3	50	230/400	Purchased in bulk.
Chingleput	Chingleput Electric Supply Co.	100	a. c.	3	50	440	Diesel.
Chinsurah	East India Electric Supply & Traction Co. Ltd.	.....	a. c.	3	50	230/400	Purchased in bulk.
Chirkunda	.....	.....	a. c.	3	50	230/400	
Chittagong	Assam Bengal Railway Co. Ltd.	.....	a. c.	3	50	230/400	Purchased in bulk.
Chittoor	Chittoor Electric Supply Co.	.....	a. c.	3	50	230/400	Do.
Chittur (Cochin)	Chittur Power House, Cochin State	94	a. c.	3	60	230/400	Diesel.
Chromepet	.....	.....	a. c.	3	50	250/440	
Cocanada	Cocanada Municipality	450	a. c.	3	50	230/400	Diesel.
Cochin	South India Electric Corp.	140	a. c.	3	50	230/400	Do.
Coimbatore	Government of Madras	.....	a. c.	3	50	230/400	
Comilla	Comilla Electric Supply Co.	204	a. c.	3	50	230/400	Diesel.
Conjeevaram	Conjeevaram Municipality	.....	a. c.		50	230/400	
Cooch Behar	Cooch Behar State Electric Department	250	d. c.		.....	220/440	Diesel.
Coonoor	Government of Madras	.....	a. c.	3	50	230/400	
Cuddalore	.....	.....	a. c.		50	230/400	
Cuddapah	Cuddapah Electric Supply Co.	230	a. c.	3	50	230/400	Diesel.
Cuttack	Cuttack Electric Supply Co.	300	d. c.	.....	.....	230/460	Do.
Dabhoi	Dabhoi Electric Power Supply Co.	215	d. c.	.....	.....	220/440	Diesel.
Dacca	Dacca Electric Supply Co. Ltd.	[3]3000	a. c.	3	50	220/440	Steam.
Dadu	.....	.....	d. c.	.....	.....	230/460	
Daman	Daman Electric Supply Co.	127	a. c.	.....	50	230	
Darbhanga	Darbhanga-Laheria Serai Electric Supply Corp. Ltd.	160	a. c.	3	50	230/400	Diesel.
Darbhanga Raj	Darbhanga State	270	d. c.	.....	.....	220	Steam.
Darjeeling	Municipal Power House	1,200	a. c.	.....	50	230/400	Hydro.
Dehra Dun	Mussorie-Dehra Hydro Electric Scheme	.....	a. c.	3	50	230/400	Diesel and bulk.
Delhi	Central Electric Power Authority	11,600	a. c.	3	50	230/400	Steam.
			d. c.	.....	.....	250/500	
Deogarh	.....	.....	a. c.	3	.....	230/400	
Dera Ghazi Khan	Dehra Ghazi Khan Electric Supply Co.	90	a. c.	.....	50	230/400	Diesel.
Dera Ismail Khan	.....	.....	d. c.	.....	.....	220/440	
Devakotah	Sri Meenskshi Electric Supply Corp.	300	a. c.	3	50	230/400	Purchased in bulk.
Dhari	Dhari Electric Supply Co.	.....	a. c.	.....	50	440	
Dhariwal	New Edgerton Woolen Mills, Ltd.	900	a. c.	3	50	230/400	Steam.
Dharwar	Dharwar Electric Supply Co. Ltd.	130	a. c.	3	50	230/400	Diesel.
Dholpur	Dholpur State Power Supply Co.	250	a. c.	.....	50	240/420	Do.
Dhond	.....	.....	a. c.	3	50	230/400	
Dhrangadhra	.....	1,235	d. c.	.....	.....	220/400	Diesel.
Dhubri	Dhubri Electric Supply Co.	108	a. c.	.....	50	230/400	Do.
Dhulia	Dhulia Electric Supply Co.	328	a. c.	3	50	230/400	Do.
Dibrugarh	Dibrugarh Electric Supply Co.	325	d. c.	.....	.....	230/460	Do.
Dindigul	.....	.....	a. c.	.....	50	230/400	
Dishergarh	Dishergarh Power Supply Co.	16,000	a. c.	3	50	230/400	Steam.
Dohad	Dohad Electric Supply Co. Ltd.	240	a. c.	3	50	230/400	Diesel.
Dum Dum	Calcutta Electric Supply Corp. Ltd.	.....	a. c.	3	50	230/400	Steam.
Ellore	.....	.....	a. c.	3	50	230/400	
English Bazar	.....	.....	d. c.	.....	.....	230/460	
Ernakulam	Cochin State Power Light Corp.	1,200	a. c.	3	50	230/400	Diesel.
Erode	Salem-Erode Electric Distribution Co. Ltd.	1,840	a. c.	3	50	230/400	Purchased in bulk.
Etah	Seth Ramgopal & Partners	.....	a. c.	.....	50	230/400	
Etawah	Alopi Prasad & Sons, Ltd.	.....	a. c.	.....	50	230/400	
Faridpur, Farrukhabad, Fatehgarh	Farrukhabad Electric Supply Co. Ltd.	460	a. c.	.....	50	230/400	Diesel.
			a. c.	3	50	220/380	
Fazilka	Fazilka Electric Supply Co.	300	a. c.	3	50	230/400	Diesel.
Ferozepur	Municipal Electricity Department	.....	a. c.	3	50	230/400	Do.
Do.	North Western Railway	120	a. c.	3	50	230/400	Do.
Firozabad	.....	.....	a. c.	3	50	230/400	
Fort William	Fort William Electric Supply Co.	120	d. c.	.....	.....	220/440	Steam and bulk purchased.

[2] Generators a. c., but distribution except Ballygunge Suburb d. c. by use of convertors.
[3] 3,000 kw. steam plant replaced 1,350 kw. Diesel on or about July 1, 1941, but local distribution is 220/440 by use of convertors.

Digitized by Google

Electric Current Characteristics — Continued

City or town	Ownership	Kw.	Consumers' supply				Prime mover
			Type	Phase	Cycle	Voltage	
Fyzabad	Military Engineer Services, Eastern Command	180	d. c.			230/460	Diesel.
Fort Sandeman	Military Engineer Services, Western Command	7	d. c.			110	
Gadag	Gadag Electric Supply Co.	220	3w - d. c.			230/460	Diesel.
Gauhati	Gauhati Electric Supply Corp.	192	a. c.	3	50	230/400	Do.
Gaya	Gaya Electric Supply Co. Ltd.	422	3w - d. c.			250/500	Do.
Giridih	Giridih Electric Supply Co. Ltd.	208	a. c.	3	50	230/400	Do.
Goa	Commissao Municipal De Marmagao	150	d. c.			240/440	Do.
Godhra	Godhra Electricity Co. Ltd.	500	a. c.	3	50	230/400	Steam.
Gonda			a. c.	3	50	230/400	
Gondia	Gondia Electric Supply Co.	150	a. c.	3	50	230/400	Diesel.
Gorakhpur	Gorakhpur Electric Supply Co.		d. c.			240/440	
Gudivada	Gudivada Electric Supply Corp.		a. c.	3	50	230/400	Purchased in bulk.
Gujarkhan	Rawalpindi Electric Power Co. Ltd.	210	a. c.	3	50	230/400	Diesel.
Gujranwala	Gujranwala Electric Supply Co. Ltd.	650	a. c.	3	50	230/400	Do.
Gujrat	Punjab Electric Power Co. Ltd.	232	a. c.	3	50	230/400	
Gulbarga	Hyderabad State	360	a. c.	3	50	230/400	Diesel.
Gulmarg	Jammu & Kashmir State Government		a. c.	3	25	110/220	Purchased in bulk.
Guntur	Guntur Power & Light Co. Ltd.		a. c.	3	50	230/400	Do.
Gurdaspur			a. c.	3	50	230/400	
Gwalior	Gwalior Electric Supply Co.	2,000	a. c.	3	50	230/400	Steam.
Hafizabad			a. c.	3	50	230/400	
Hansi	Rohtak & Hissar Electric Supply Co. Ltd.	288	a. c.	3	50	230/400	Diesel.
Hardwar	Municipal Board, Hardwar Union	450	a. c.	3		220/380	Hydro and purchased in bulk.
Hathras			a. c.	3	50	230/400	
Hindupur	Hindupur Municipality	60	d. c.			230/460	Diesel.
Hinganghat	Hinganghat Electric Supply Co. Ltd.	259	d. c.			240	Do.
Hissar	Rohtak & Hissar Electric Supply Co. Ltd.	248	a. c.	3	50	230/400	Do.
Hoshiarpur	Hoshiarpur Electric Supply Co. Ltd.	442	a. c.	3	50	230/400	Do.
Hospet	Municipal Electric Works	9,855	a. c.	3	50	230/400	Do.
Howrah	Calcutta Electric Supply Corp. Ltd.		d. c.			225/450	
Hubli	Hubli Electricity Co.	600	a. c.	3	50	230/400	Diesel.
Hyderabad (Sind)	Hyderabad Electric Supply Co.	2,234	a. c.	3	60	220/380	Do.
Hyderabad (St.)	Hyderabad State Electric Supply Dept.	9,750	a. c.	3	50	230/400	Steam.
Ichapur (Ishapur)	Calcutta Electric Supply Corp. Ltd.		a. c.	3	50	230/400	
Imphal	Manipur State Power House	200	a. c.	3	50	230/400	Hydro.
Indore	Indore State Electric Supply Dept.	2,540	a. c.	3	50	200/400	Steam.
Jacobabad			a. c.			230/400	
Jagadhri	Jagadhri Electric Supply Co.	172	a. c.	3	50	230/400	Diesel.
Jalpaiguri			a. c.	3	50	230/400	
Jamalpur	East Indian Railway Co.	3,950	d. c.			230/400	Steam.
Jammu	Jammu & Kashmir State Government	1,491	a. c.	3	50	110/220	Hydro and diesel.
Jamnagar		840	d. c.			220/440	Do.
Jamshedpur	Tata Iron & Steel Co. Ltd.	73,000	a. c.	3	50	220/440	Steam.
Jaora	Jaora Electric Supply Co.	246	d. c.			230/460	Do.
Jaswantnagar			a. c.	3	50	230/400	
Jaunpur			a. c.	3	50	230/400	
Jealgora	Eastern Coal Co. Ltd.	2,000			50		Steam. (Colliery only.)
Jhansi	Jhansi Electric Supply Co. Ltd.	280	a. c.	3	50	230/400	Diesel.
Jhelum	Rawalpindi Electric Power Co. Ltd.	350	d. c.			220/440	Do.
Jodhpur	State Electric Power Scheme	1,000	a. c.	3	50	230/400	
Juhu			a. c.	3	50	230/400	
Jullundur	Jullundur Electric Co.	1,500	a. c.	3	50	230/400	Purchased in bulk.
Kalimpong	Kalimpong Electric Supply Co.	80	a. c.	3	50	230/400	Diesel.
Kalipahari	Ghusick Power Station	500	a. c.		50	230	Steam. (Colliery only.)
Kalka	Kalka & Simla Suburbs Electric Supply Co.	60	a. c.		50	240/420	Diesel.
Kalol	Kalol Electric Supply Co.	120	a. c.	3	50	230/400	Do.
Kalyan	Andhra Valley Power Supply Co. Ltd.		a. c.	3	50	230/400	Hydro.
Kamalia	Kamalia Electric Supply Co.	74	a. c.	1-3	50	230/400	Diesel.
Kamptee	Military Engineer Services		d. c.			220/440	
Kamptee Road	Nagpur Electric Light & Power Co. Ltd.		d. c.			220/440	Steam.
Kanadukathan	Kanadukathan Electric Supply Corp.	370	a. c.	3	50	230/400	Diesel.
Kanke	Government Power House	160	d. c.			220/440	Do.
Kapurthala	Kapurthala State Power House	370	a. c.	3	50	230/460	Diesel and bulk purchased.
Karachi	Karachi Electric Supply Corp. Ltd.	7,876	a. c.	3	50	220/380	Diesel.
Do.	.....do.....		d. c.			220/440	Do.
Karaikudi	Sri Meenakshi-Sundareswaral Electric Power Co.		a. c.	3	50	230/400	Purchased in bulk.
Karamadai	Government of Madras		a. c.	3	50	230/400	
Karnal	Karnal Electric Supply Co.	200	a. c.	3	50	230/400	
Karur	Government of Madras		a. c.	3	50	230/400	
Kasauli	Kasauli Electric Supply Co.	154	a. c.	3	50	230/400	Diesel.
Kasganj	Kasganj Municipality						Purchased in bulk.
Katmandu	Nepal Government Power House	1,774	a. c.	1 and 3	60	120/220/380	Hydro.
Katni			a. c.	3	50	230/400	
Khairpur	Khairpur Mirs Electric Supply Co.	142				230	Diesel.
Khamgaon	Khamgaon Electric Supply Co.	224	a. c.	3	50	230/400	Do.
Khandwa	Khandwa Electric Supply Co.	247	d. c.			220/440	Do.
Khargpur	Bengal Nagpur Railway	4,750	d. c.			220/440	Steam.
Khaur Oil Field	Attock Oil Co. Ltd.	735	a. c.			440	Diesel and gas.
Do.	.....do.....		d. c.			110/220	
Kheri			d. c.			220/400	
Khulna	Khulna Electric Supply Corp. Ltd.	240	a. c.	3	50	230/400	Diesel.
Khurja	Khurja Municipality		a. c.	3	50	230/400	Purchased in bulk.
Kirkee	Poona Electric Supply Co.		a. c.	3	50	230/400	Do.
Kohat	Military Engineer Services, Northern Command	200	d. c.			220/440	Diesel.
Kolar Gold Fields	Kolar Mines Power Station, Ltd.	3,700	a. c.	3	25	230	
Krishnagar			a. c.	3	50	230/400	
Kumbakonam	Kumbakonam Electric Supply Co.	1,103	a. c.	3	50	230/400	Hydro.
Kurseong	Kurseong Hydro-Electric Supply Co.	400	a. c.	3	50	230/400	Do.

Digitized by Google

Electric Current Characteristics — Continued

City or town	Ownership	Kw.	Consumers' supply				Prime mover
			Type	Phase	Cycle	Voltage	
Kushtia	Kushtia Electric Supply Co	20	d. c.			230	Diesel.
Lahore	Lahore Electric Supply Co. Ltd	17,450	a. c.	3	50	230/400	Steam.
			d. c.	1		220/440	Do.
Lahore	North Western Railway	7,600	d. c.			220/440	Do.
			a. c.	3	50	230/400	
Larkana	Larkana Electric Supply Co. Ltd	200	a. c.	3	50	230/400	Steam.
Lashkar City	Gwalior Electric Supply Co. Ltd	2,000	d. c.			230/460	Do.
			a. c.	3	50	230/400	
Lonavla	Lonavla-Khandalla Electric Supply Co	104	a. c.	3	50	230/400	Purchased in bulk.
Lucknow	U. P. Electric Supply Co. Ltd	10,900	a. c.	3	50	230/400	Steam.
			[4]d. c.				
Ludhiana	Moga & Jagram Electric Supply Co	77	a. c.	3	50	230/400	Diesel.
Lyallpur	Tendianwalla Electric Supply Co	109	a. c.	3	50	230/400	Do.
Madras	Madras Electric Supply Corp. Ltd	34,000	a. c.	3	50	250/440	Steam.
			d. c.			225/450	
Madura	Madura Municipality	750	a. c.	3	50	230/440	Diesel.
Mahableshwar	Mahableshwar Electric Supply Co. Ltd	25	d. c.			230/460	Do.
Mahad	Mahad Electric Supply Co. Ltd	80	a. c.	3	50	230/400	Do.
Mahe	Malabar Electric Co		a. c.	3	50	230/400	Purchased in bulk.
Malakand	State Electric Works	216	a. c.	3	50	220/380	Hydro.
Malegaon	Malegaon Electric Supply Co	101	a. c.	3	50	230/400	Purchased in bulk.
Malerkotla	Malerkotla Electric Supply Co. Ltd	112	d. c.			230/460	Diesel.
Malkapur	Malkapur Electric Supply Co	160	a. c.	3	50	230/400	Do.
Mambalam	Madras Electric Supply Corp. Ltd		a. c.	3	50	250/440	Steam.
Mandi-Bahauddin	Mandi-Bahauddin Electric Supply Co	236	a. c.	3	50	230/440	Diesel.
Mandsaur	Mandsaur Electric Supply Co. Ltd	120	a. c.		50	220/440	Do.
Mangalore	Mangalore Electric Supply Co. Ltd	750	a. c.	3	50	230/400	Do.
Manmad	Manmad Electric Supply Co. Ltd	400	a. c.	3	50	230/400	
Masulipatam	Masulipatam Municipality		a. c.	3	50	230/400	
Matheran	Matheran Electric Supply Co	120	a. c.	3	50	230/400	Diesel.
Mayavaram			a. c.	3	50	230/400	
Meerut	Upper Jumna Electric Supply Co. Ltd		a. c.	3	50	230/400	Purchased in bulk.
Mehsana	Mehsana Electric Supply Co	384	a. c.	3	50	230/400	
Mhow	Mhow Electric Supply Co	460	d. c.			230/460	Diesel.
Mian Channu	Mian Channu Electric Supply Co. Ltd	65	a. c.	3	50	230/400	Do.
Mianwali	Mianwali Electric Supply Co. Ltd	102	a. c.	3	50	230/400	Do.
Midnapur	B. N. Elias & Co. Ltd	144	a. c.	3	50	230/400	Steam.
Miraj	Miraj Electric Supply Co	200	a. c.	3	50	230/400	Diesel.
Mirpurkhas			a. c.	3	50	230/400	
Mirzapur	Mirzapur Electric Supply Co. Ltd		a. c.	3	50	230/400	Steam.
Moghulpura	North Western Railway	7,600	d. c.			240/440	Do.
			a. c.	3	50	230/400	
Mohora	Kashmir Hydro-Electric Installation		a. c.	3	25	110/220	Hydro.
Mohuda	Mohuda Power Station	1,000	a. c.	3	50	230/400	Steam.
Monghyr	Monghyr Electric Supply Co. Ltd	1,000	[5]a. c.	3	50	230/460	Do.
Montgomery	Punjab Electric Power Co		a. c.	3	50	230/400	Purchased in bulk.
Moradabad	Upper Ganges Valley Electric Supply Co		a. c.	3	50	230/400	Purchased in bulk.
Morvi	Morvi Electric Supply Works	653	a. c.	3	50	230/400	Diesel.
Muktagacha	Atani Raj Estate Power House	86	d. c.				Do.
Muktsar	Muktsar Electric Supply Co		a. c.	3	50	220/400	Do.
Multan	Multan Electric Supply Co. Ltd	1,870	a. c.	3	50	230/400	Steam.
Munnar	Munnar ValleyElectric Works		a. c.	3	50	220	
Munshiganj	Munshiganj Ice Co	48	d. c.			230	Diesel.
Murree	Murree Electric Supply Co	582	a. c.	3	50	230/400	
Mussorie	Mussorie City Board	4,600	a. c.	3	50	230/400	Hydro and Diesel.
Muttra	Muttra Electric Supply Co. Ltd	1,100	a. c.	3	50	230/400	Steam and Diesel.
Muzaffarabad	Kashmir State Generating Station	88	a. c.	3	50	220	Hydro.
Muzaffargarh	Small Town Electric Supply Co	155	a. c.	3	50	230/400	Diesel.
Muzaffarpur	Mozufferpore Electric Supply Co	610	d. c.			220/400	Do.
Mysore	Government of Mysore		a. c.	3	60	110/220	
Nadiad	Nadiad Electric Supply Co. Ltd	360	a. c.	3	50	230/400	Diesel.
Nagarcoil	Nagarcoil Electric Supply Co. Ltd	135	a. c.	3	50	230/400	Do.
Nagpur	Nagpur Electric Light & Power Co	3,200	a. c.	3	50	230/400	Steam.
			d. c.			220/440	
Naini Tal	Naini Tal Hydro-Electric Scheme	800	a. c.	3	50	220/380	Hydro.
Nanded	Hyderabad State Power Station		a. c.	3	50	230/400	Steam.
Nandurbar	Nandurbur Electric Supply Co	160	a. c.	3	50	230/400	Diesel.
Narasaraopet	Narasaraopet Electric Corp. Guntur	175	a. c.	3	50	230/400	Do.
Narayanganj	Narayanganj Electric Supply Co	340	a. c.	3	50	230/400	Do.
Narsingarh St	Shri Vikram Power House	115	d. c.			220/440	Do.
Nasik	Nasik Deolali Electric Supply Co	1,200	a. c.	3	50	230/400	Do.
Nattarasankottai	Nattarasankottai Electric Supply Corp	124	a. c.	3	50	230/400	Do.
Navsari	Navsari Electric Supply Co. Ltd	400	a. c.	3	50	220/400	Do.
Nawabshah	Nawabshah Electric Supply Co	130	a. c.	3	50	230/400	Do.
Negapatam	Negapatam Electric Supply Co. Ltd		a. c.	3	50	230/400	Purchased in bulk.
Nemmara	Power House, Cochin	80	a. c.	3	50	230/400	Diesel.
New Delhi	Government Public Works Department	4,500	a. c.	3	50	230/400	Steam.
Nipani	Nipani Electricity Co	64	a. c.	3	50	230/400	Diesel.
Nizamabad	Hyderabad State Power Station	270	a. c.	3	50	230/400	Do.
Noa Goa	Services Autonomos de Electricidade	550	a. c.	3	50	220/380	Do.
			d. c.			220/440	Do.
Okara	Okara Electricity Supply Co	400					Diesel.
Okkur	Reliance Electric Supply Corp		a. c.	3	50	230/440	Purchased in bulk.
Ongole	Ongole Electric Supply Co	250	a. c.	3	50	400	Diesel.
Ootacamund	Government of Madras		a. c.	3	50	230/400	
Pabna	Pabna Electric Supply Co	320	a. c.	3	50	220/400	Diesel.
Padrauna			d. c.			220/440	Steam.

[4] d. c. also available by convertor.
[5] Distribution is d. c. by use of convertors.

Digitized by Google

Electric Current Characteristics — Continued

City or town	Ownership	Kw.	Consumers' supply				Prime mover
			Type	Phase	Cycle	Voltage	
Palghat	Palghat Electric Supply Corp	220	a. c.	3	50	230/400	Purchased in bulk.
Palitana	Palitana State Electric Works	132	3w - d. c.			230/460	Diesel.
Pallivasal	Travancore State Government	13,500	a. c.	3	50	230/400	Hydro.
Panchgani	Panchgani Electric Supply Co	90	d. c.			230/460	Diesel.
Pandharpur	Pandharpur Electric Supply Co. Ltd	141	d. c.			230/460	Do.
Panvel	Panvel Electric Supply Co		a. c.	3	50	230/400	Purchased in bulk.
Patan	Patan Municipality	270	a. c.	3	50	230/400	Diesel.
Patiala	State Hydro-Electric Branch	870	a. c.	3	50	230/400	Steam and Diesel.
Patna	Patna Electric Supply Co. Ltd	6,000	a. c.	3	50	220/380	Steam.
			d. c.			220/440	
Pattoki	Pattoki Electric Supply Co	112	a. c.	3	50	400	Diesel.
Peshawar	N. W. F. P. Hydro-Electric Scheme	9,600	a. c.	3	50	230/400	Hydro.
Do	Peshawar Electric Supply Co	2,300	a. c.	3	50	230/400	Steam.
			d. c.			220/440	
Petlad	Electric Power House, Baroda	150	a. c.	3	50	220/440	Diesel.
Phillaur			a. c.	3	50	230/400	
Pilibhit	Pilibhit Electric Supply Co	272	a. c.	3	50	230/400	Diesel.
Pollachi	Government of Madras	200	a. c.	3	50	230/400	
Poona	Poona Electric Supply Co. Ltd		a. c.	3	50	230/400	Purchased in bulk.
			d. c.			220/440	
Prodattur	Prodattur Electric Supply Corp		a. c.	3	50	230/400	Diesel.
Pudukottah	Pudukottah Electric Supply Co. Ltd		a. c.	3	50	230/400	Purchased in bulk.
Puri	Puri Electric Supply Co. Ltd		a. c.	3	50	230/400	Diesel.
Pykara	Government of Madras	39,000	a. c.	3	50	230/400	Hydro.
Quadian			a. c.	3	50	230/400	
Quetta	Quetta Electric Supply Co. Ltd	650	a. c.	3	50	230/400	Diesel.
Quilon	Quilon Electric Supply Co. Ltd	546	a. c.	3	50	230/415	Do.
Raichur	Raichur Power Station, Hyderabad State	540	a. c.	3	50	230/400	Do.
Raipur	Raipur Municipality	240	a. c.	3	50	230/400	Steam.
Rajamundry	Rajamundry Electric Supply Co	435	a. c.	3	50	230/400	Diesel.
Rajshahi			d. c.	1		230/460	
Ramchandrapuram	Brahmavidyambal Electric Supply Corp	135	a. c.	3	50	230/400	Diesel.
Rameswaram	Rameswaram Devasthanam Electric Supply Scheme	99	d. c.			110	
Rampur	Rampur State Power House	2,000	a. c.	3	50	110/230/420	Diesel.
Ranchi			a. c.	3	50	230/400	Steam.
Rander	Rander Electric Supply Co	200	a. c.			230/400	
Rangoon	Rangoon Electric		d. c.			230/460	Diesel.
Rangpur	Rangpur Electric Supply Corp	200	a. c.	3	50	230/400	Steam.
Raniganj	Raniganj Electric Supply Co		a. c.	3	50	220/440	Diesel.
Ratlam	Ratlam Electric Supply Co	500	a. c.	3	50	230/400	Purchased in bulk.
Ratnagiri			d. c.			230/460	
Rawalpindi	Rawalpindi Electric Power Co. Ltd	4,800	a. c.	3	50	230/400	
Rohri	Rohri Municipality		a. c.	3	50	230/400	Steam.
Rohtak	Rohtak & Hissar Electric Supply Co	292	a. c.		50	230/400	Purchased in bulk.
Roorkee	Ganges Hydro-Electric Grid		a. c.	3	50	230/400	Diesel.
Rupar	Rupar Electric Supply Co	178	a. c.	3	50	230/400	Hydro.
Sabarmati	Ahmedabad Electricity Co. Ltd	15,000	a. c.	3	50	230/440	Diesel.
Saharanpur	Saharanpur Electric Supply Co	1,000	a. c.	3	50	230/400	
Sahebgunge	Sahebgunge Electric Supply Co		a. c.	3	50	230/400	Purchased in bulk.
Saidapet	Madras Electric Supply Corp. Ltd		a. c.	3	50	230/400	Diesel.
			d. c.			225/450	
Salem	Salem-Erode Electric Distribution Co	1,840	a. c.	3	50	230/400	
Sangamner	Sangamner Electric Supply Co	80	d. c.			230/460	Purchased in bulk.
Sangli	Jubilee Electric Works	200	a. c.	3	50	230/400	Diesel.
Sangrur	Jind State Power House	100	d. c.			230	Do.
Sargodha	Sargodha Electric Supply Co		a. c.	3	50	230/400	Do.
Satara	Satara Electric Supply Co	200	a. c.	3	50	230/400	Bulk.
Satna	Rewa Electric Supply Co	140	a. c.	3	50	230/400	Hydro.
Saugor	Saugor Electric Supply Co	300	a. c.	3	50	230/400	Diesel.
Secunderabad	H. E. H. The Nizam's Government		a. c.	3	50	230/400	Do.
Seoni	Seoni Electric Supply Co	105	a. c.	4	50	230/400	Diesel.
Shahdadpur	Tando-Adam Shadadpur Electric Co	200	a. c.	3	50	230/400	Do.
Shahdara	Lehore Electric Supply Co		a. c.	3	50	230/400	
Shahjahanpur	Shahjahanpur Electric Supply Co	775	a. c.	3	50	220/380	Diesel.
Sheikhpura	Mandi Hydro-Electric Scheme		a. c.	3	50	230/400	Hydro.
Shikarpur	Shikarpur Electric Supply Co	366	a. c.	3	50	230/400	Diesel.
Shillong	Shillong Hydro-Electric Co	300	a. c.			230/400	Hydro.
Shimoga	Government of Mysore		a. c.	3	25	230	Do.
Sholapur	Sholapur Spinning and Weaving Co	250	a. c.	3	50	230/400	Steam.
Sialkot	Sialkot Electric Supply Co	1,000	a. c.	3	50	230/400	Do.
Sikar	Sikar State Electric Power Co		a. c.	3	50	230/400	Diesel.
Silchar	Silchar Electric Supply Co	206	d. c.			240/440	Do.
Simla	Simla Municipality	3,100	a. c.	3	50	220/380	Hydro and Diesel.
Sirohi	Laxman Electric Supply Co	100	a. c.	3	50	230/400	Diesel.
Sitapur	Sitapur Electric Supply Co	150	d. c.			220/440	Do.
Sitarampur	Dishergarh Power Supply Co		a. c.	3	50	230/400	Purchased in bulk.
Sivasamudram	Government of Mysore	45,000	a. c.	3	60/25	230	Hydro.
Srinagar	Jammu & Kashmir Hydro Electric Co			(See Jammu)			
Srirangam	Trichinopoly-Srirangam Electric Supply Co		a. c.	3	50	230/400	Purchased in bulk.
Srivilliputhur	Srivilliputhur Taluk Electric Co		a. c.	3	50	230/400	Do.
Sukkur	Sukkur Municipality		a. c.	3	50	220/400	Diesel.
Surat	Surat Electric Supply Co	3,624	a. c.	3	50	230/400	Do.
Sylhet	Sylhet Electric Supply Co	190	a. c.	3	50	230/400	Do.
Tando-Adam	Tando-Adam Electric Supply Co	160	a. c.	3	50	230/400	Diesel.
Tando Md. Khan	Tando Md. Khan Kambar Electric Co	176	a. c.	3	50	230/400	Do.
Tangail	Tangail Electric Supply Co	17	d. c.			230	
Tanjore	Tanjore Municipality		a. c.	3	50	230/400	Purchased in bulk.
Tarana	Tarana Electric Power House	80				220/230	
Tatanagar	(Same as Jamshedpur)						
Tellicherry	Malabar Electric Company		a. c.	3	50	230/400	Purchased in bulk.

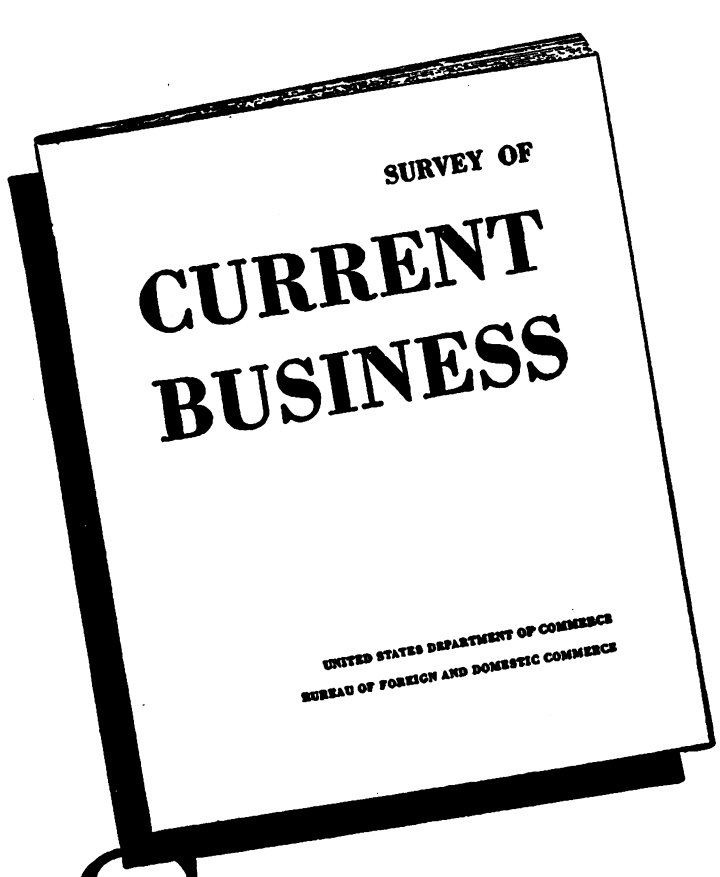
Digitized by Google

Electric Current Characteristics — Continued

City or town	Ownership	Kw.	Consumers' supply				Prime mover
			Type	Phase	Cycle	Voltage	
Tezpur	Tezpur Electric Supply Co. Ltd	94	d. c.	.....	.....	220	Diesel.
Tinnevelly	Tinnevelly-Tuticorin Electric Supply Co	1,475	a. c.	3	50	230/400	Do.
Tirupathi	Tirumalai-Tirupati Devasthanam Electric Co	160	a. c.	3	50	230/400	Do.
Tiruppur	Government of Madras	.....	a. c.	3	50	230/400	
Trichinopoly	Trichinopoly-Srirangam Electric Supply Co	.....	a. c.	3	50	230/400	Purchased in bulk.
Trichur	Trichur Municipality	810	a. c.	3	50	230/400	Diesel.
Trivandrum	Government of Travancore State	300	a. c.	1	50	230	
Tundla	Western U. P. Electric Power Co	.....	a. c.	3	50	230/400	
Tuticorin	Tinnevelly-Tuticorin Electric Supply Co	.....	a. c.	3	50	230/400	
Udipi	Udipi Electric Supply Co. Ltd	268	a. c.	3	50	230/400	Diesel.
Udumalpet	Government of Madras	.....	a. c.	3	50	230/400	
Ujjain	Gwalior Electric Supply Co	2,000	a. c.	3	50	230/400	Steam.
			d. c.	.....	.....	230/460	
Vadnagar	Vadnagar Industrial & Electrical Works	64	a. c.	3	50	440	Diesel.
Vankaner	Vankaner State Power House	100	d. c.	.....	.....	230/440	Do.
Vellore	Vellore Electric Corporation	300	a. c.	3	50	230/400	Do.
Villupuram	South Arcot Electric Distribution Co	.....	a. c.	3	50	230/400	Purchased in bulk.
Vizagapatam	Vizagapatam Electric Supply Co	.....	a. c.	3	50	230/400	Do.
Wadhwan Camp	Zalawar Electric Supply Co	296	a. c.	3	50	220/440	Diesel.
Wai	Wai Electric Supply Co	56	a. c.	3	50	230/400	Do.
Warangal	Warangal Power Station, Hyderabad State	.....	a. c.	3	50	230/400	
Wardha	Wardha Electric Supply Co	200	a. c.	3	50	230/400	Steam.
Yeotmal	Yeotmal Electric Supply Co	133	a. c.	3	50	230/400	Diesel.

★ U. S. GOVERNMENT PRINTING OFFICE: 1947——707803—268

Digitized by Google



$3.00
per year

SURVEY OF CURRENT BUSINESS

THIS AUTHORITATIVE MONTHLY PERIODICAL makes easily available to businessmen over 2,200 comprehensive facts about production, stocks, orders, prices, sales, shipments, etc., of the industries of the United States by means of text, tables, charts, and index numbers.

A sample copy will be sent, on request to the
Bureau of Foreign and Domestic Commerce,
Washington, D. C.

$3.00 per year, from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Digitized by Google

A New Service

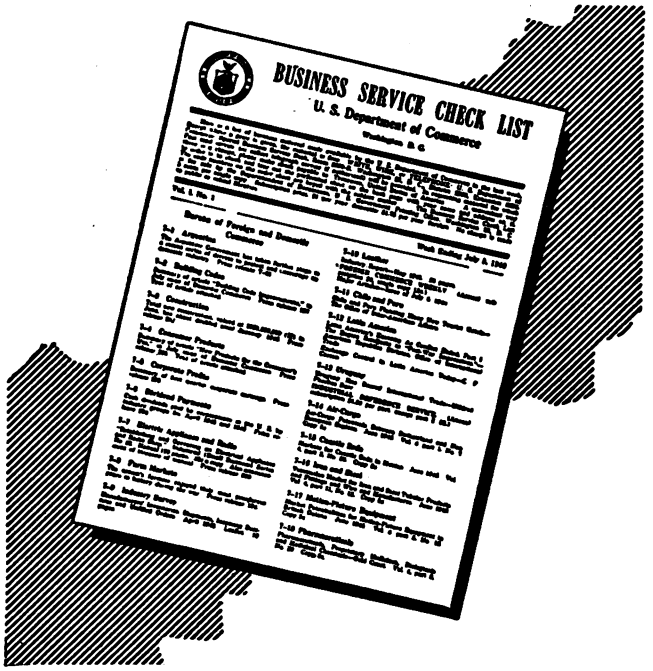
by the U. S. DEPARTMENT OF COMMERCE

BUSINESS SERVICE CHECK LIST

The U. S. Department of Commerce itemizes all news releases, publications, speeches, pamphlets, and books published the previous week in its weekly Business Service Check List. This listing will enable you to order the material that will be of specific aid to you in your business.

Typical of the listed material that will interest you are marketing data, articles on specific industries and business, foreign markets, establishing and operating numerous kinds of small businesses, and foreign industrial wartime secrets.

Many of the items in the BUSINESS SERVICE CHECK LIST are free.



The listing covers these Bureaus and Offices:

- Census Bureau
- Civil Aeronautics Administration
- Coast and Geodetic Survey
- Foreign Trade Zones Board
- National Bureau of Standards
- Office of Business Economics
- Office of Domestic Commerce
- Office of International Trade
- Office of Small Business
- Office of Technical Services
- Patent Office
- Weather Bureau

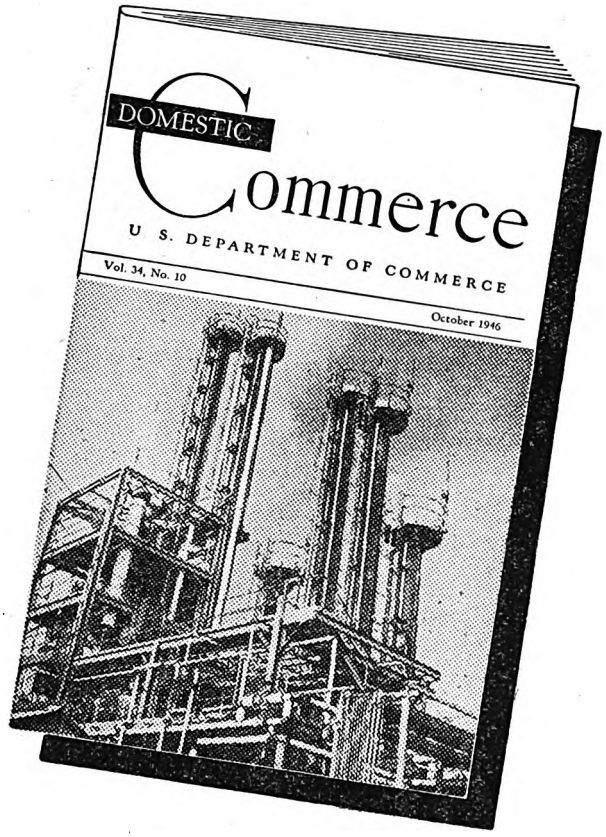
Annual subscription **$1** *A sample copy will be sent on request.*

Order today from the

Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

Digitized by Google

Every Businessman Could Profit by Reading . . .



Pocket Size

DOMESTIC COMMERCE

96 Pages of Facts and Ideas!

- Timely news on problems that face businessmen today.
- Marketing information on numerous business activities.
- Economic surveys and trends.
- New products being designed for consumer use.
- Progress and changing conditions of industry and business.
- Monthly listing of all business service material published by the U. S. Department of Commerce.
- What's New—a regular feature on patents dedicated for public use, and new and abandoned patents.

These are typical of the material currently appearing. Articles written by specialists in the U. S. Department of Commerce as well as those of other governmental agencies.

Annual Subscription $2

Order today from the

Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

(Make check payable to Treasurer, U. S. A.)

Digitized by Google

Documents Room

Industrial Reference Service

U. S. DEPARTMENT OF COMMERCE, W. AVERELL HARRIMAN, *Secretary*
Office of International Trade, ARTHUR PAUL, *Director*

Part 1. TRANSPORTATION and PUBLIC UTILITIES

INDIANA UNIVERSITY
MAR 12 1947
LIBRARY

Available in Parts Covering Selected Services and Commodities
Annual Subscription $1.50. Price this report 5 cents
For sale by the Superintendent of Documents, Government Printing Office, Washington 25, D. C., or any of the Department's Field Offices

D 18400

Volume 4—Part 1 December 1946 Number 33

Highways of Guatemala and El Salvador

By Elisha E. Early, Transportation and Communications Division, Special Services and Intelligence Branch

Based on reports of Foreign Service Officers, United States Embassies at Guatemala City and San Salvador, and other official reports

HIGHWAYS OF GUATEMALA

General Information

Guatemala, with an area of 42,364 square miles, is one of the smallest Nations in the Western Hemisphere. Bounding Guatemala on the west and north are Mexico and the Caribbean Sea; on the east, British Honduras, Honduras, and El Salvador; and on the south, the Pacific Ocean. The 1940 census shows the population to be 3,283,209, the largest in Central America. The south and west sections of the country are by far the most densely populated areas. Guatemala City, the capital of the Republic, had, according to the census of 1940, a population of 177,000. Other densely inhabited cities are Quezaltenango, Puerto Barrios, Zacapa, and Mazatenango. The monetary unit is the quetzal, which is equivalent to the United States dollar.

With the exception of the low lands along the coast, the Republic lies at an altitude of from 4,000 to 13,500 feet. The chain of mountains which traverses its territory, and sends out a number of spurs, forms several plateaus. These regions are healthful and fertile, and produce products of the tropical and temperate zones.

The climate is hot and no months are without rain in the lower lands bordering the Gulf of Honduras. Elsewhere the total amounts of rain are less and a "winter" dry season is characteristic.

Guatemala is almost entirely an agricultural country. Over 90 percent of its population are engaged in agriculture, and practically all of its exports are agricultural products.

Of the six Central American Republics, Guatemala has the largest trade. In terms of value, prewar coffee exports were generally 60 to 70 percent of total exports; bananas, 20 to 30 percent; and chicle, less than 5 percent. Imports generally include a wide range of manufactured products, some raw materials (petroleum products), and some foodstuffs, notably wheat flour. In the past several years manufactured articles have been, by value, the greater part of all imports.

The United States is the principal market for Guatemalan exports, receiving from 50 to 70 percent of the total. As for imports, about 50 percent are supplied by the United States.

This series of Latin American highway reports is designed to present data concerning the highway mileage and type of construction, adequacy of the highway system in terms of economic needs, and national policy in regard to new road construction. It is believed that this information will aid the motor vehicle and construction machinery and equipment industries in making analyses of market potentialities in those countries not only for a short-range program in the immediate postwar years, when equipment depreciated and retired during the war will be replaced, but for a long-range program in the later years, when the present demand for replacements will have been met.

Highway Development

It is estimated that 6,631 kilometers of highway were open to traffic in Guatemala, as of the end of 1944; however, a total of 6,953 kilometers is reported as having been constructed. The highway network is divided into a primary system, called the National Highways, under the Department of Roads (Direccion General de Caminos), and a secondary system that is under the jurisdiction of the heads of each political subdivision, known as Departments, existing in Guatemala.

Table 1 shows the length of the national and departmental highways, by type of construction, as of the close of 1944.

TABLE 1. — *Guatemalan Highways — Length, by Construction Type, 1944*

Type	Kilometers	Miles
National:		
Paved	30	18.6
Macadamized	15	9.3
Waterbound macadam	700	435.0
Improved earth, sand, clay, or gravel	2,290	1,422.8
Total	3,035	1,885.7
Departmental:		
Nonsurfaced, in use	3,596	2,234.2

Source: Highway Questionnaire 1944.

In addition to the mileage of National Highways as shown in table 1, it was officially claimed that 628 kilometers (390.2 miles) were contem-

Digitized by Google

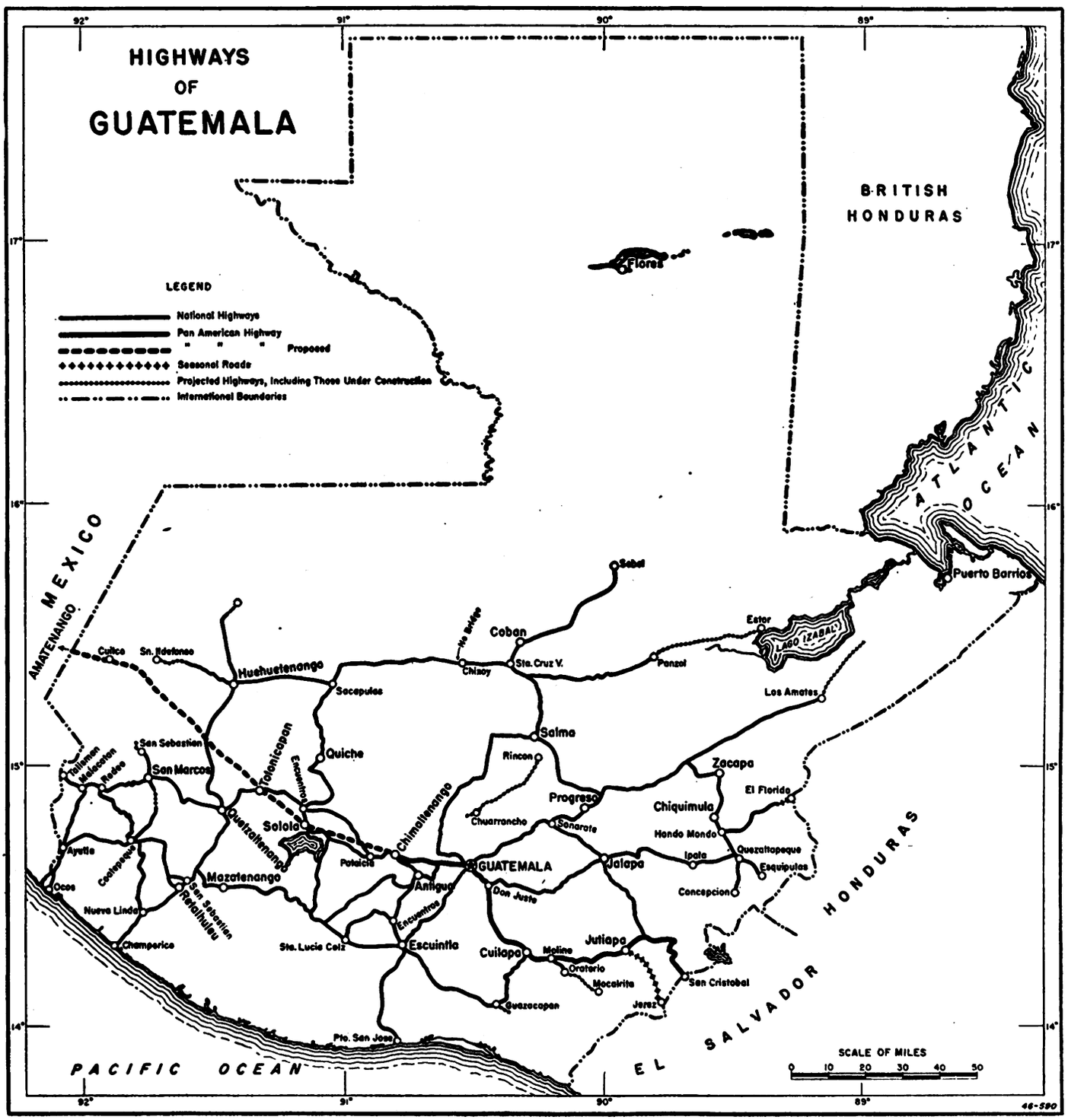
plated for construction. The various departments have been engaged in bettering their highways and, as of the close of 1944, it was estimated that some 300 kilometers (186.4 miles) were projected or under construction.

Planning and Financing

The Department of Roads is charged with the planning and construction of all highways included in the national system of roads. Until the end of 1944, the Department had functioned under the jurisdiction of the Ministry of Agriculture. In January 1945 it was placed under the Ministry of Communications and Public Works.

During the fiscal year 1944–45, the Department of Roads was scheduled to have spent $1,428,224.03 (U. S. currency) and is planning to budget $1,500,000 for 1945–46, according to the Director General of Roads, who furnished this information as of June 1945. Of the total amount to be spent in 1945–46, it is estimated that $600,000 will be spent on construction of the Carretera Internacional del Pacifico and another $600,000 on the Inter-American Highway. Most of the remainder will be utilized in maintaining and improving existing highways, allowing only a small amount for other new construction work.

Approximately half of the total amount is estimated to be supplied by the gasoline tax of 20 cents per gallon. The head tax of $2 annually on all males between 18 and 60 years of age, part of which was used for road improvements, has been eliminated. The remainder of the funds to be spent on highways, not obtained through the gasoline tax, is provided through ordinary revenue.



Digitized by Google

Material and Equipment

During 1944, 3,037 metric tons of asphalt, valued at $6,183, were imported by the Department of Roads. Of this amount all except 26 metric tons was imported from the United States. Cement used for highway construction in Guatemala is of domestic manufacture.

Opportunities for United States road contractors should be discounted, since all highway work in Guatemala is carried out by the Government. The work of planning and supervising the construction and maintenance of the highways is almost completely in the hands of Army officers, graduates of the Escuela Politécnica (the cadet school for Guatemalan Army officers), who are detailed to the Roads Department. The projected portion of the Guatemalan section of the Pan American Highway is under the supervision of the Public Roads Administration of the United States.

United States exports of road-building equipment and machinery to Guatemala over the past several years were somewhat curtailed owing to war restrictions. The equipment taken over by the Guatemalan Government which is being used in the construction of the Pan American Highway will greatly aid the country in its future road-building program.

Table 2 shows the amount and the value of road-building machinery exported by the United States to Guatemala during calendar years 1944 and 1945.

TABLE 2.—*United States Exports of Road-Building Equipment and Machinery to Guatemala, 1944–45*

[Value in United States dollars]

Type	1944		1945	
	Number	Value	Number	Value
Excavator parts and accessories	.....	1,342	.....	6,154
Concrete mixers	.....	.....	2	1,065
Graders, self-propelled	1	5,000	.....	.....
Graders, pull or push	.....	.....	1	1,860
Scrapers, self-loading	1	3,300	.....	.....
Bulldozers, angle dozers, etc.	3	3,498	4	3,092
Other road machinery and parts	.....	6,416	.....	6,729
Air compressors, stationary and portable	5	1,691	17	2,067
Track-laying tractors, carburetor	.....	.....	.....	.....
Tractors, injection	6	17,540	9	27,376
Total	16	38,787	33	48,343

NOTE: No excavators, including power shovels, road rollers, or graders (other than those specified), and track-laying tractors, carburetor were exported to Guatemala.

Source: U. S. Bureau of Census.

Principal Highways

With the exception of the Pan American Highway, which is written up as a separate section of this survey, table 3 lists the principal roads of the country.

TABLE 3.—*Principal Highways of Guatemala—Terminal Points, Length, and Type and Condition*

From	To	Length		Notes on conditions
		Kilometers	Miles	
Guatemala City	San Jose	100.7	63	All-weather road, including approximately 15 kilometers of paved surface from junction with the Pan American Highway to near Amatitlan
Guatemala City	Santo Tomas	325.0	202	All-weather road, including about 3 kilometers of paved surface within Guatemala City to Rio Hondo, 170 kilometers. Remander of road should be classed as dry-weather only, but much of region through which it passes has a small annual rainfall.
Guatemala City	El Peten	472.6	294	All-weather road to Candelaria, 260 kilometers from Guatemala City. Rest of road dry-weather only.
Escuintla	El Pijiji	120.8	75	All-weather road. 58.4 kilometers near El Salvador border under construction; little work done on this section since 1942.
Escuintla	Ayutla	246.2	153	All-weather road. A number of bridges finished and under construction on this route. Railroad parallels road at all important points.
San Julian	El Estor	133.1	83	102.1 kilometers completed and in service. All-weather road. Bridges lacking. Verapaz Railway parallels road from Pancajche to Panzos, which two points are the railroad terminals.
Santa Cruz Verapaz	(Projected to end in Cuilco)	255.7	159	All-weather road. No rail connections. 195 kilometers officially completed. 60 kilometers from San Rafael Petzal to Cuilco may be chosen as the route for part of the new Pan American Highway now under survey.
Malacatan	Ocos	51.5	32	Completed from San Pablo near Malacatan. All-weather road. Connection with railroad at Ayutla.
Quezaltenango	Champerico	78.8	49	All-weather road.
Quezaltenango	Santa Cruz Barillas	232.2	144	113 kilometers classed as being under construction; little progress on constructed area since 1942. No rail connections. Completed section is an all-weather road.
Pachila	Popoya	86.3	53	All completed, no rail connections, all-weather road.
Godinez	Palmira	36.7	23	All completed, no rail connections, all-weather road.
San Marcos (La Union)	Coatepeque	57.2	35	All-weather road, 10 kilometers uncompleted. Connects with main line of railroad at Coatepeque.
San Marcos (La Union)	Tacana	72.8	45	22.8 kilometers completed, rest under construction. Section finished is an all-weather road.
Nueva Linda	El Rodeo	108.5	68	Completed all-weather road. Connects with railroad at Coatepeque.
Chimaltenango	Rodeo	37.1	23	No rail connections, all-weather road. 14 kilometers from Alotenango to Rodeo dry-weather only, owing to poor condition.
Patzicia	Sacapulas	142.5	89	All completed, all-weather road, no rail connections.
Cuilapa	Chiquirmulilla	38.3	24	All completed, all-weather road, no rail connections.
El Rancho	Salama	60.8	38	All-weather road, connects with railroad at El Rancho.
Guatemala City	Esquipulas	211.2	131	All completed, all-weather road, connects with railroad at Guatemala.
El Progreso	Jutiapa	90.2	56	All-weather road, completed. Connects with railroad at Sanarato and El Progreso.
Zacapa	Chiquimula	85.2	53	All-weather road, completed.
Vado Hondo	Honduran border	49.9	31	Inferior construction, no rail connections. Dry-weather only.
El Molino	El Platanar	45.0	30	10 kilometers in service, remainder under construction. Little has been done in finishing this project.
Jutiapa	Jerez	37.0	23	Complete reconstruction of road to keep open to traffic. Uncompleted, washouts numerous.

Digitized by Google

Pan-American Highway

Routes No. 1 and No. 2 are currently known as the Pan American or Inter-American Highway in Guatemala. They link Talisman on the Mexican frontier with San Cristobal Frontera on the El Salvador frontier. Route No. 6-W, including part of Route No. 8 (Ayutla to Malacatan) and part of Route No. 3 (Escuintla to Guatemala City), may be considered as an alternate "Pan American" Highway, which is further indicated by its official name, Carretera Internacional del Pacifico (International Highway of the Pacific).

This route and the present Route No. 2 were to have constituted the Guatemalan sector of the Inter-American Highway, as contemplated in the construction program carried out during 1942 and 1943 jointly by the United States and Guatemala under the former organization known as the "Ruta Militar de Emergencia" (Emergency Military Route). These plans were abandoned, however, in October 1943, when the machinery used on the project was turned over to the Guatemalan Government on the condition that the latter would spend an equivalent of the estimated value of the equipment on finishing the road.

In August 1944, an agreement was signed between the United States and Guatemala providing for the expenditure of $9,900,000 (one-third to be contributed by Guatemala and two-thirds by the United States) in the construction of what would be in effect a new Inter-American Highway in Guatemala, although much of it would follow established routes. Generally speaking, the new Inter-American Highway will enter Guatemala from Amatenango (Mexico) via the Cuilco River Valley, joining the present Route No. 1 at a point as yet undetermined and more or less follow Route No. 1 to Guatemala City. From Guatemala City south, the Inter-American Highway will probably not be greatly changed from the present Route No. 2 to San Cristobol Frontera on the El Salvador border.

The decision of Mexico not to build its Inter-American Highway to Tapachula, which is joined to the present Guatemala sector of the Pan American Highway at Talisman, but to Amentenango, where no road connection with Guatemala exists, made the choice of the Chilco route necessary.

It is probable that the first section of the new Inter-American Highway to be built will be that between Guatemala and Chimaltenango, on which surveys are already reported as completed. Construction is scheduled tentatively to begin out of Guatemala City towards Chimaltenango within the very near future. Meanwhile, United States and Guatemala engineers are studying the possible routes to be followed from the Mexican border, where no roads exist at present on either side of the frontier. On the Guatemalan side of the Mexican border the present road reaches only as far as San Rafael Petzal, lacking 60 kilometers of completion to Cuilco and another 40 kilometers (approximate) to the Mexican border. Thus termination of the western section of the projected Inter-American Highway in Guatemala would open up an entire new agricultural zone not far distant from the chief mines in the Department of Huehuetenango. The remainder of the new road, however, although a vast improvement over existing facilities, could not be expected to contribute significantly to the development of Guatemala's internal economy, despite the fact that it will traverse a relatively thickly settled part of the Guatemalan highlands, since these areas are already interconnected with the rest of Guatemala by other all-weather roads.

It is to be noted, in this connection, that the Inter-American Highway, as planned, does not touch on the country's coffee-producing zones, although it will be adequately linked to them by the Guatemalan road system.

Present plans call for completion of the new Inter-American Highway within 5 years, with the investment of $2,000,000 (U. S. currency) annually in new construction. However, as soon as a link-up with the Mexican frontier is made (and assuming that Mexico has completed its sector of the road to Amatenango by that time), a serviceable through connection to the United States will have been established, even before the entire Inter-American Highway project for Guatemala is realized.

Other Road Projects

Not included in the total figures of roads constructed in Guatemala are some 170 kilometers of temporary logging roads built during 1943 and 1944 in the Department of Peten, connecting certain mahogany producing zones with British Honduras, through which point export of mahogany logs from Peten is effected. These roads were built with private capital supplied by three United States mahogany timber importers and do not form part of the Guatemalan highway system.

The General Situation

Highway progress during the past several years was usually slow throughout Guatemala. During 1944 less new mileage was added to the road system than in any previous year since 1930. In fact, there has been something of a tendency for roads once in use (particularly departmental roads) to fall into disuse. Since 1942 only 109 kilometers of new roads on the national part of the system have been put into service. A small number of additional kilometers of national roads have been built, such as the progress made on several routes, but a lack of bridges in these areas has prevented the use of the roads. Practically no progress whatsoever has been made since 1942 on the feeder roads to the Department of Peten, which is still isolated from the rest of the country, except by air or over trails impassable for long periods during each year. Likewise, other pioneer roads, such as the road from Quezaltemango to Santa Cruz Barillas and the road from San Marcos (La Union) to Tacana, have been omitted from the road improvement program.

Bridges

In the years 1931 through 1940 a considerable amount of bridge construction was undertaken in Guatemala. Table 4 clearly shows the extent in construction of drainage facilities in the highways of Guatemala.

TABLE 4.—*Number of Bridges and Other Drainage Structures Constructed from 1931 to 1940, Inclusive*

Department	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	Total
Alta Verapaz	4	1	1	4	5	4	5	3	24	3	54
Baja Verapaz	.....	.....	4	2	1	2	1	2	3	.....	15
Chimaltenango	2	.....	15	7	15	14	2	4	3	.....	62
Chiquimula	.....	.....	11	3	8	2	5	3	1	.....	33
Esquintla	1	3	6	10	6	6	3	5	5	7	52
Guatemala	.....	5	.....	1	.....	3	3	2	3	1	18
Huehuetenango	.....	3	.....	16	16	8	3	1	1	4	52
Izabal	.....	.....	1	.....	6	.....	1	.....	5	.....	13
Jalapa	5	1	.....	.....	4	3	.....	1	9	3	26
Jutiapa	.....	.....	.....	5	.....	4	1	6	.....	1	17
Peten	.....	.....	.....	2	.....	.....	.....	.....	.....	.....	2
El Progreso	.....	1	.....	1	1	4	7	2	.....	.....	16
Quesaltenango	2	4	.....	.....	6	14	.....	6	6	2	40
Quiche	.....	8	15	18	17	4	5	8	2	1	78
Retalhulen	1	.....	.....	6	6	3	3	4	3	1	27
Sacatepequez	2	.....	.....	5	5	7	2	3	1	.....	25
San Marcos	1	.....	2	24	26	15	3	5	4	.....	80
Santa Rosa	1	.....	.....	1	4	6	4	7	.....	1	24
Solola	.....	2	8	2	3	.....	2	.....	.....	.....	17
Suchutepequez	.....	6	.....	1	6	.....	11	6	8	3	41
Totonicapan	.....	.....	10	1	2	3	.....	.....	.....	.....	16
Zacapa	.....	.....	.....	.....	.....	3	.....	1	1	.....	5
Total	19	34	73	109	137	105	61	69	79	27	713

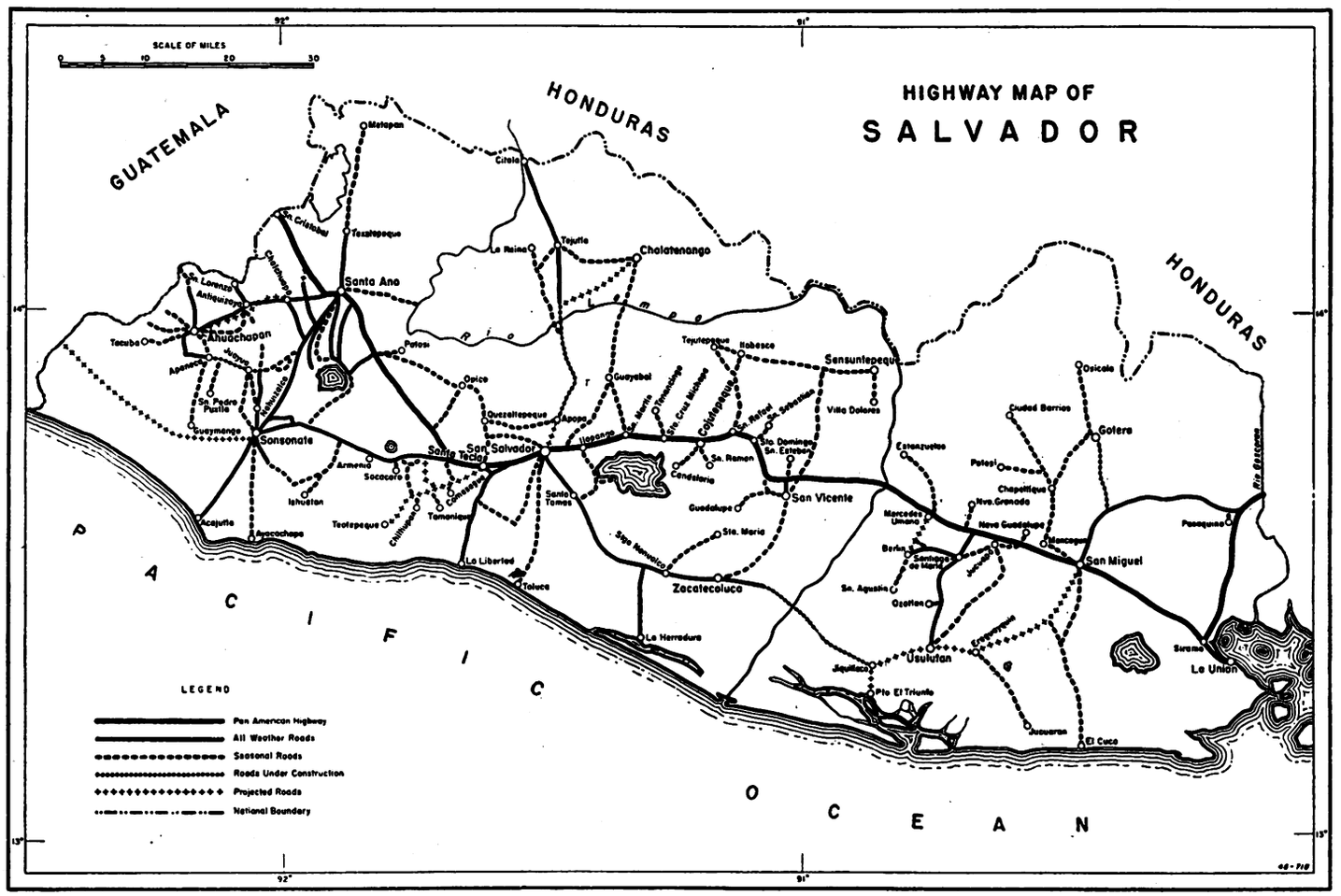
Digitized by Google

Motor Vehicle Registrations

Registrations for motor vehicles declined in the past several years owing to the shortage of gasoline, tires, parts, and accessories. The principal reason for the shortage was that the machinery used in the manufacture of such items had to be utilized during the war in making military equipment. As will be seen in table 5, trucks were the only type of motor equipment to show an increase. This is because they are essential both for passenger transportation and for freight haulage throughout the country.

TABLE 5.—*Motor Vehicle Registrations in Guatemala January 1, 1941 and January 1, 1944*

Type of vehicle	January 1, 1941	January 1, 1944
Passenger cars	3,014	2,570
Busses	683	624
Trucks	1,015	1,144
Diesel units	112	.....
Total	4,824	4,338


HIGHWAY MAP OF
SALVADOR
GUATEMALA
HONDURAS
HONDURAS
SCALE OF MILES
0 5 10 20 30
Metapan
Citala
Chalatenango
La Reina
Tejutla
Texistepeque
Santa Ana
Chalchuapa
Atiquizaya
Ahuachapan
Tacuba
Apaneca
Juayua
Concepcion
Ataco
Salcoatitan
Turin
Potosi
Opico
Quezaltepeque
Apopa
Guazapa
Nejapa
Tonacatepeque
Cojutepeque
Ste. Cruz Michapa
El Rosario
Suchitoto
Teotepeque
Habesco
Sensuntepeque
Villa Dolores
Sto. Domingo
San Estevan
Ste. Ramon
Candelaria
San Vicente
Guadalupe
Ste. Maria
Santa Tomas
San Salvador
Santa Tecla
Armenia
Sacacoyo
Ilopango
Sonsonate
Izalco
Nahuizalco
Juayua
Ataco
Salcoatitan
Sn. Pedro Puxtla
Guaymango
Ishuatan
Acajutla
Apaneca
Tacuba
Ahuachapan
Atiquizaya
Chalchuapa
Santa Ana
Metapan
Cristobal
Tejutepeque
La Reina
Tejutla
Chalatenango
Citala
Suchitoto
Potosi
Opico
Quezaltepeque
Apopa
Nejapa
Guazapa
Tonacatepeque
Cojutepeque
Ste. Cruz Michapa
El Rosario

Imports into the country are numerous; such items as chemicals, medicines, fertilizers, and soaps lead at the present time. Prior to the war automobiles, trucks, and automotive supplies were imported also; however, the war halted these imports. The need for them has increased and a few are being received in the country.

Planning and Financing

National highways are planned, constructed, and supervised by the Department of Public Works of the Central Government. The planning and construction of departmental highways are supervised by the various departmental governments, usually in cooperation with, and often with the assistance of, the Department of Public Works. Municipal roads are constructed and maintained by the municipal governments, with the exception of streets in San Salvador and Santa Ana, which are constructed by the Department of Public Works.

The sources of funds for road building and maintenance are derived in various ways. Appropriations are made by the Legislative Assembly from general revenues. Also, some special taxes are levied for the raising of funds for construction and maintenance of the highways. A few of these are the highway tax, taxes of "aguardiente" distilleries, steamship company taxes, and insurance taxes. There are miscellaneous other sources of various types.

Materials and Equipment

The United States has been the main source of supply of materials and equipment for highway construction and maintenance in El Salvador. Owing to the important part the United States plays in the road-building program of the country, many United States manufacturers of machinery and equipment are represented here. In previous years, much cement used on the highways was imported from Europe. However, the war cut off that source, and the General Supply Office of the El Salvadoran Government began exploring the possibility of obtaining cement from some of the South American countries. However, because of quality requirements, cement used in bridge and culvert construction is imported from the United States.

El Salvador imports all of the basic materials for road building, including equipment, machinery and tools. Table 6 gives a partial list of the road-building equipment and machinery which was exported by the United States to the Republic for the calendar years of 1944 and 1945. Small tools, such as shovels, picks, and hammers, are omitted from the table because of the many uses for which they can be applied.

TABLE 6.—*United States Exports of Road-Building Equipment and Machinery to El Salvador, 1944 and 1945*

[Value in U. S. dollars]

Type	1944		1945	
	Number	Value	Number	Value
Concrete mixers	.....	.....	3	1,805
Bulldozers, angles, dozers, etc.	1	1,590	.....	.....
Other road machinery and parts	.....	893	.....	190
Air compressors, stationary and portable	4	6,571	18	17,128
Track-laying tractors, carburetor	.....	.....	2	1,968
Tractors, injection	9	31,459	17	60,684
Total	14	40,513	40	81,775

NOTE: No excavators, including power shovels, excavator parts and accessories, road rollers, graders of any type, or self-loading scrapers were exported to El Salvador.

Source: U. S. Bureau of Census.

Status of Highways

The improved highways all have a width of 20 feet which allows for two-way traffic.

Among the most important cities or towns touched by the highways are: San Salvador, Santa Ana, San Miguel, Ahuachapan, Sonsonate, Santa Tecla, Cojutepeque, Zacatecoluca, San Vincente, Sensuntepeque, Usulutan, Acajutla, La Libertad, and La Union. Highway connection points with other transport media are as follows: Water, Acajutla, La Libertad, La Union; air, Ilopango; rail, Ports of Acajutla and La Union, Sonsonate, Ahuachapan, Santa Ana, San Salvador, San Vincente, Zacatecoluca, Usulutan, and San Miguel.

Table 7 shows the length of highways in El Salvador, by type of construction, as of June 1945. It excludes trails used only on rare occasions by automotive traffic during the dry season.

Main Highways

Table 8 shows the main highways, with notes on conditions.

Other Roads

Other important roads in the economic development of the country are:

	Mileage
Santa Ana to Ahuachapan	26.0
San Salvador to La Libertad	22.4
San Salvador to Santa Ana (Pan American)	41.3
San Miguel to La Union (Partially Pan American)	28.8

TABLE 7.—*Highway Length, by Construcion Type[1], as of June 1945*

Type	Kilometers	Miles
Unimproved earth and nonsurfaced[2]	1,318	818.9
Improved earth, sand, clay, gravel, etc.	546	339.2
Macadam, surface treated and penetration	340	211.2
Bituminous concrete and asphalt	12	7.4
Total, all types	2,216	1,376.7

[1] No waterbound macadam or cement concrete roads reported.

[2] Do not include trails.

TABLE 8.—*Main Highways of El Salvador—Terminal Points, Length, and Type and Condition*

From	To	Length (in miles)	Notes on conditions
San Salvador	Acajutla	56.2	Not entirely finished, being improved, connects coffee area with Sonsonate.
Apopa	Honduran border	64.6	21.7 miles surfaced with local materials, sections of old road built of dirt without grading, but are passable at any time of year.
San Miguel	Agua Salada	34.1	All improved crushed stone surface and 20 feet wide. Used as an alternate road between these two points to the Pan American Highway.

Developmental Highways

The following information with point-to-point mileage, is given for developmental roads designed for opening up new areas for the production of essential metals, minerals, lumber, agricultural and other important products.

Main Northern Highway to Department of Chalatenango.—It is planned to connect the Main Northern Highway with the capital of the Department of Chalatenango by means of an improved road 14.2 miles long. In the sections already constructed there are some bridges not yet built, but traffic is carried on over provisional wooden bridges. As this road will run through a wheat-growing area it should prove as an asset in fostering increased production and strengthening the country's economic condition.

San Salvador–Zacatecoluca–Jiquilisco–San Miguel Highway.—At the present time this road is under construction. The total length of the highway upon completion will be 94.4 miles. A section of 35.4 miles, with all bridges and with asphalt penetration surface, is completed. The grading work for an additional section of

Digitized by Google

8.6 miles has been finished. Bridges missing from this latter section are under construction at the present time.

It has been planned that this highway when completed will be an alternate choice to the Pan American Highway. Although it will be 9.3 miles longer than the Pan American Highway between San Salvador and San Miguel, it is believed that it will have the advantage of being better designed, and, consequently will permit greater speeds, thus drawing much of the internal and inter-American traffic. Furthermore, the road will run through the flatter coastal region, and it will not be necessary for traffc to climb the altitudes necessary through this mountainous section of the Pan American Highway.

Because of the fertility of the soil, the regions which this road traverses are known as the granary of the country. Large quantities of cotton, cereals, and oils are produced in this area. Also, there are in this region installations for a milk industry, and cattle breeding is extensive.

Jiquilisco–El Triunfo.—Plans are under consideration for the construction of a road extending from Jiquilisco to the port of El Triunfo. It is anticipated that this road will follow the present location of a roadbed which is not being utilized at the present time. This highway obviously will be of great value once it is opened. Its length will be 3.7 miles.

Other roads being planned.—These are listed below:

From	*To*	*Length (miles)*
Berlin	Mercedes Umana	7.4
Chalatenango	Northern Highway	14.2
San Salvador	Apopa	7.4
Santa Tecla	Teotepeque and other La Cumbre villages	24.8
Chalchuapa	Ahuachapan	16.1
El Parvenir	Pan American Highway	1.8
Sonsonate	Guatemalan border	27.9

Bridges

All bridges on the improved roads are 20 feet in width. Only one underpass is reported to exist on the highways of El Salvador. It is located 4.9 miles east of the capital, and has a vertical clearance of 12 feet, 6 inches, and a horizontal clearance of 24 feet, 5 inches.

San Salvador-Sonsonate-Acajutla Highway

Los Cedros Bridge: 100-foot span—structural steel on masonry buttresses—concrete surface.

Guarumal Bridge: 140-foot span—structural steel on masonry buttresses—concrete surface.

Copapayo Bridge: 160-foot span—from sections of 40 feet—masonry buttresses—concrete supports—steel girders—reinforced concrete surface.

Bridges under construction on the above-named highway are the masonry steel and concrete bridges over the Colon, Chuchucato, Aters, Shutia, and Cuntan rivers. All minor drainage work on these bridges has been completed. They will be similar in construction type to the Copapayo bridge, and will have spans of 80, 40, 200, 40, and 80 feet, respectively. All of the bridges will have a width of 20 feet.

Main Northern Highway

There is a suspension bridge over the Lempa River. It has a 314.9-foot suspension span, plus an additional approach of 98.4 feet, which gives a total span of 413.3 feet.

It is planned to replace the various wooden bridges on this highway with modern bridges as soon as the work can be accomplished.

San Salvador - Zacatecoluca - Jiquilisco-San Miguel Highway

The following steel bridges have been completed on this highway: Comalapa, 100-foot span; Sepecuiapa, 100-foot span; Tilapa, 125-foot span; Jalpanga, 75-foot span; San Juan, 75-foot span; Huiscoyalapa, 75-foot span; Huaxala, 75-foot span; and Jibon River Bridge, 480-foot span (12 sections of 40 feet each).

It is planned to build a bridge over the Lempa River at Kilometer 80 which will be a combination of light bridge and transshipment, or if possible a regular bridge, with several lanes, of 1,800-foot span. If the former is constructed it will suspend for an extension of 1,250 feet, and will have two lanes for light traffic with a maximum of 5,000 pounds gross—one lane of traffic in each direction. In the middle there would be a transhipper for vehicles of up to 15 tons, with a capacity for transshipping up to 190 heavy vehicles in 24 hours. It is thought likely that bridges similar to those already completed will be selected as the most practical.

Pan American Highway

Completed bridges are as follows: Rio Sucio, steel, 140-foot span; Agua Calienta, reinforced concrete, 50-foot span; Quebrada Seca, steel, 100-foot span; Cuscatlan, over the Lempa River, 1,354-foot total span (820-foot suspension—two additional steel sections with a length of 229 feet—the rest reinforced concrete girders—the whole rests on concrete abutments and piers—calculated to carry moving load of 15 tons); Jalapa, steel, 75-foot span; La Gallina, steel girders, masonry piles, 40-foot span; Mira Flores, steel girders, two 40-foot spans; San Antonio, steel girders, three 40-foot spans; La Quebradono, steel girders, 40-foot span; International Bridge, over the Guascoran River, structural steel, three spans (129 feet, 6 inches, 222 feet, and 127 feet, 6 inches)—total span of 479 feet. All carry a load of 15 tons.

Bridges under construction are as follows: Urbina, over the San Miguel River, three structural steel spans 140, 160, and 140 feet, being constructed on reinforced concrete abutments and piers; Sirama, structural steel, 200-foot span; and Pasaquina, structural steel, three spans which total 228 feet. These bridges will carry a load of 15 tons.

Pan American Highway

The Pan American Highway in El Salvador has a total length of 193.2 miles, of which 149.1 miles have been paved with macadam asphalt, and the remaining mileage has been graded and the surface slightly improved with local materials. A small section of 3.7 miles is still in the process of construction. The bridges on the unpaved portion of the road are not complete; however, they are in the process of being constructed. A section of 17.3 miles from Bifurcacion to Agua Salada is difficult to traverse during the rainy season; however, permanent traffic to the Honduran border is carried on over the so-called Military Highway from San Miguel to the International Bridge. This highway is an all-weather road with a surface of crushed stone.

The Pan American Highway enters the Guatemalan frontier at San Critstobal, passes through Candelaria to Santa Ana, the second city of the Republic of importance, where it joins with the coffee zone of Santa Ana, Ahuachapan, and Sonsonate. From here it continues east to Santa Tecla, connecting various roads which run to the north and south. San Salvador, the capital city where the railroad and highway centers of the country meet, is the next city of importance on this route. It then extends through Cojutepeque and other towns of lesser importance, passing at a distance of 3 kilometers from San Vincente, with which city it is connected by a well-maintained road, and continues to San Miguel.

Many roads, which lead to the coffee regions of Berlin, Santiago de Maria, Jucuapa, Chinameca, Usulutan, and Ciudad Barrios, branch from the Pan American Highway before it reaches San Miguel. The highway artery likewise traverses the henequen (sisal) zone. Leaving San Miguel the highway continues east toward the port of La Union. At a point 4.9 miles from the port it turns north, and borders the Gulf of Fonseca, joining the Military Road at Agua Salada.

The Pan American Highway is highly important to El Salvador because it is the main artery of traffic in the country. At the present time there are no restrictions as to the types of vehicles which might use the highway.

The importance of the coffee crop from the standpoints of the revenue derived from its export and the effect which it has on the economic stability of the country is recognized, and the transshipment of the commodity is

Digitized by Google

facilitated by this principal overland route. Coffee grown in the eastern part of the country is sent by motortruck to San Miguel and smaller points along the line of the International Railways of Central America, from which points it is shipped to the port of La Union. Coffee grown in the western section is sent by motor vehicle to the port of La Libertad; and to points along the line of the Salvadoran Railway Co., Ltd., and then by rail to the port of Acajutla; also to junctions with the International Railways of Central America, over whose lines it is shipped to Puerto Barrios (Guatemalan Atlantic port).

The Pan American Highway is truly the backbone of the country's highway system. It bisects El Salvador from the east to west, passing through the three principal cities of Santa Ana, San Salvador, and San Miguel and connecting with the roads from every productive area in the country, and joins with routes in the neighboring republics of Guatemala and Honduras.

Two-thirds of the expense of constructing the Pan American Highway in El Salvador are borne by the United States in the form of loans granted by the Export Import Bank of the Reconstruction Finance Corporation.

Motor Vehicle Registrations

Registrations of motor vehicles in the Republic showed a slight increase in 1943 over 1940. As of January 1, 1944, registration totaled 4,074; as of January 1, 1941, there were 3,411 registrations. The following listing gives a break-down of registrations, by type of vehicle, for 1940 and 1943, as reported on January 1 of the succeeding years.

Type of vehicle	*Jan. 1, 1941*	*Jan. 1, 1944*
Passenger cars	2,346	2,700
Busses	471	676
Trucks	425	698
Diesel units	169	.....
Total	3,411	4,074

It will be seen that, with the exception of Diesel units, each type of vehicle showed an increase in the number of registrations. In view of the end of wartime retardations and the increasing availability of cars and parts it is believed that registrations for all types of vehicles will show an upward trend in the immediate future.

★ U. S. GOVERNMENT PRINTING OFFICE: 1946—707802—277

Digitized by Google

Digitized by Google

ALF Collections Vault
3 0000 099 077 707

Digitized by Google